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THIS BOOK WAS PREPARED BY

THE YOUTH TRAINING COMMITTEE OF THE FRIENDS OF ALMA

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★ALMA★

This book is dedicated to the memory of:

FRED PERDUE

and to:

Capt. Johnny Grueland

Capt. George C. Kiskaddon

Rollo Wheeler

Without their leadership and endless work this program
would be only an idea.

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* Note
A great deal of work was done
by Fred in his Alma manual. His
format was to set up a work
Book, so for lesson plans,
check his original. It can
prove invaluable for most
lesson plans.
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FORWARD



A forward

by

COMMODORE C/ LEE

Forward
WELCOME ABOARD ALMA!

ALMA: Main Gaff - Tops'l - Schooner - Hay Scow? She sure is a funny looking thing!

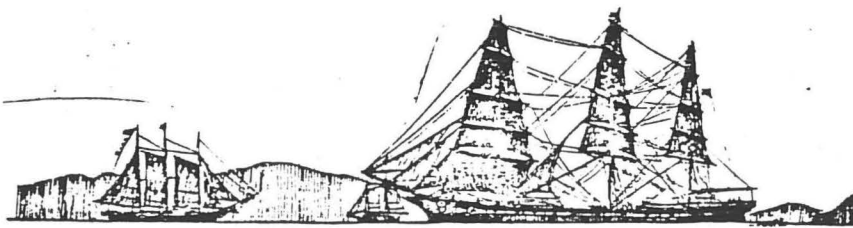
It's true. She is not a glamorous and famous sailing vessel such as the romantic packets, clippers and extreme clippers, of the glorious era of wind-driven ships. She has never known the dress of skys'l yard, or royal, or spanker aft, or stuns'l set before a fair wind and a following sea. Quite the contrary; ALMA has been a hard-working ship all her life. But had it not been for this very strong and utilitarian makeup, and her discipline for shouldering burdensome tasks throughout her lifetime, she would not exist today. ALMA is the last of a rare breed. The last of a fleet of approximately 400 Schooner Scows that were peculiarly indigenous to the San Francisco Great Bay area, possibly a throwback to the canal and fjord barges of Central and Northern Europe.

You, the young trainee and visitor, should pause and reflect, hark back to the past and become cognizant of the customs and traditions of the sea. If it were not for these gallant little "Ships of Burden", San Francisco as a city, and all of the surrounding developed areas, might not exist today.



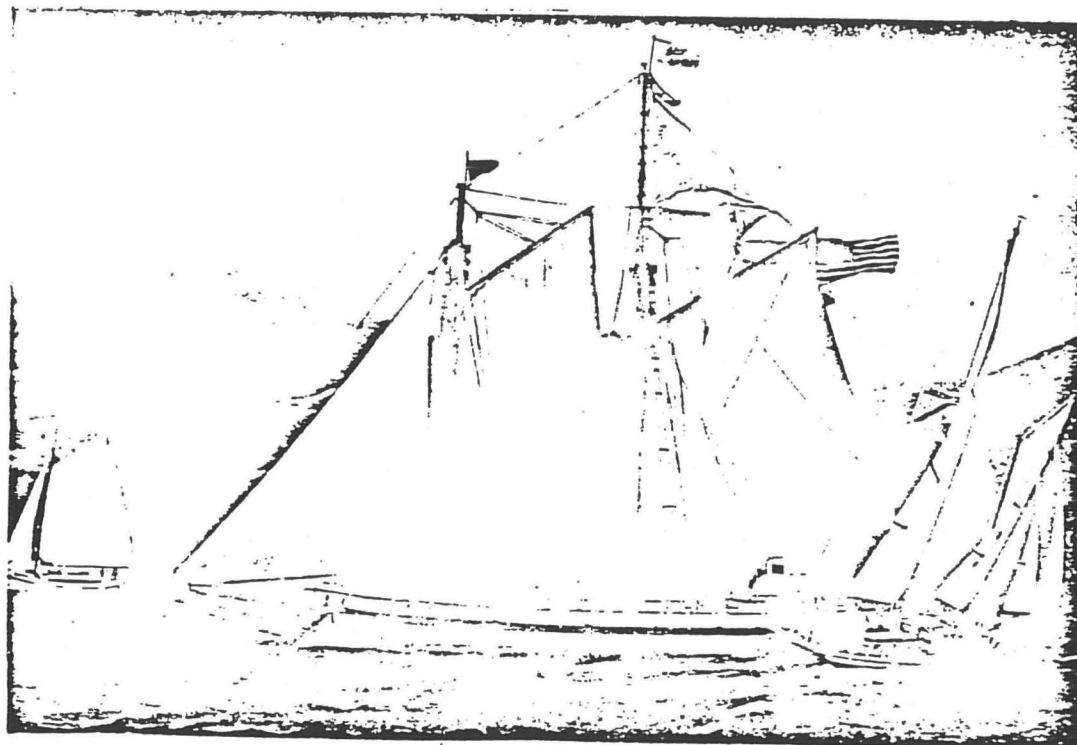
At its earliest, San Francisco was an isolated peninsula of sand dunes that, in no way, could have grown the crops of hay and grass necessary to support the livestock population which ultimately provided the transport/vehicle responsible for making it the great port and international city we know today.

It was ALMA and her sister ships, plying the Bay, Delta and Estuaries, working with the tides to furnish the infant cities their hay, lumber, fuel, poultry and eggs, food stuffs and ~~the~~ general cargo, that provisioned and nurtured city development. These little "Ships of Burden" could and must be likened to the modern, large tractor and diesel rigs which haul commerce throughout all of California and, of course, our great nation.



Historically, these ships were manned mainly by Scandinavian seamen, possibly those deep water men who found their way to the City by the Golden Gate and decided that sailing within the reaches of land might provide, somehow, a little safer and easier life for them and their families. Usually, the Captain's wife was aboard as cook, and these two formed the operational nucleus of the ship. An additional one, or several, deckhand/roustabout personnel would complete the vessel's crew.

The box-like structure of ALMA's hull--with bow sprit and bluff forefoot, hard turn to the bilge and a long shallow run of the keel--does nothing to inspire the trained eye of a seaman. But it was this hull form (penetrated only through her underpinnings by a retractable centerboard and large outside tiller) that proved so highly efficient in



the mud flats of the Delta^{and} the Estuaries, and enabled ALMA to load her life-sustaining cargoes for a hungry and burgeoning Bay Area at the shallow water pierheads provided by some of the ranches and farms along the river banks.

ALMA's classic rig and top hamper faithfully follow that of the better-known and more famous West Coast schooners. Some of the larger scow vessels carried topsails on both the fore and mainmast; others, such as ALMA, on special occasions would set a Fisherman and some triatic staysails between fore and main.

ALMA's present rig is authentic in every detail. As you train in each vessel operation, her rig, nomenclature and working sail parts will take on a live and vibrant meaning --

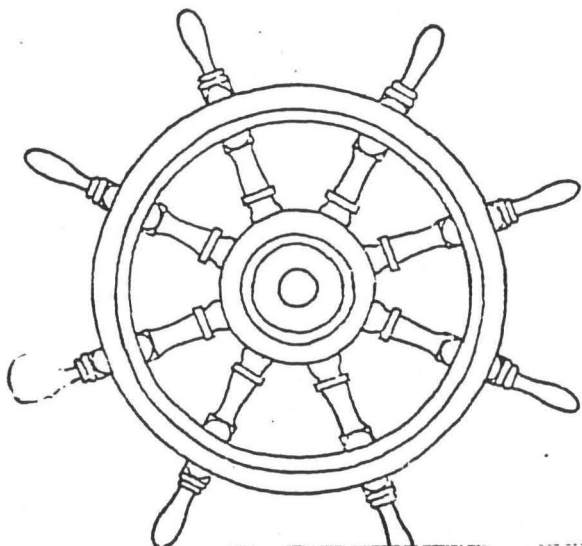
hauling on the halyard to set the staysail jib and sheet her home, heaving on the throat and peak halyards of the foresail, tending the topping lift and bullwhip, setting the main, then the topsail, making fast the tack and clew, sweating these various lines into their fairleads and pin-rail stations --

all this activity will add a dimension to your presence aboard this vessel, will provide a cherished link between you and your forefathers, will make you at one with the great navies (of ships and men) who traditionally peopled the "World of Desire" and fill the annals of maritime history and commerce.

Welcome aboard ALMA. Learn your lessons well, young person. In years to come, it will be your responsibility to pass on, preserve, and hold in your hands this treasured piece of heritage.

Remember the words of Emile Zola, "A man who rebukes his past is lost".

Safe and Happy Sailing!

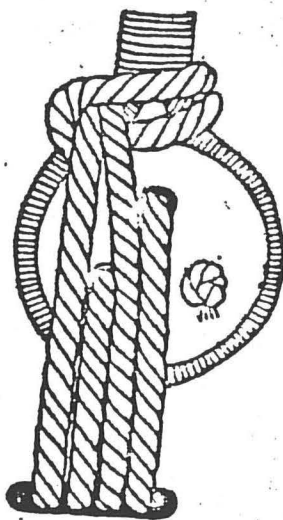


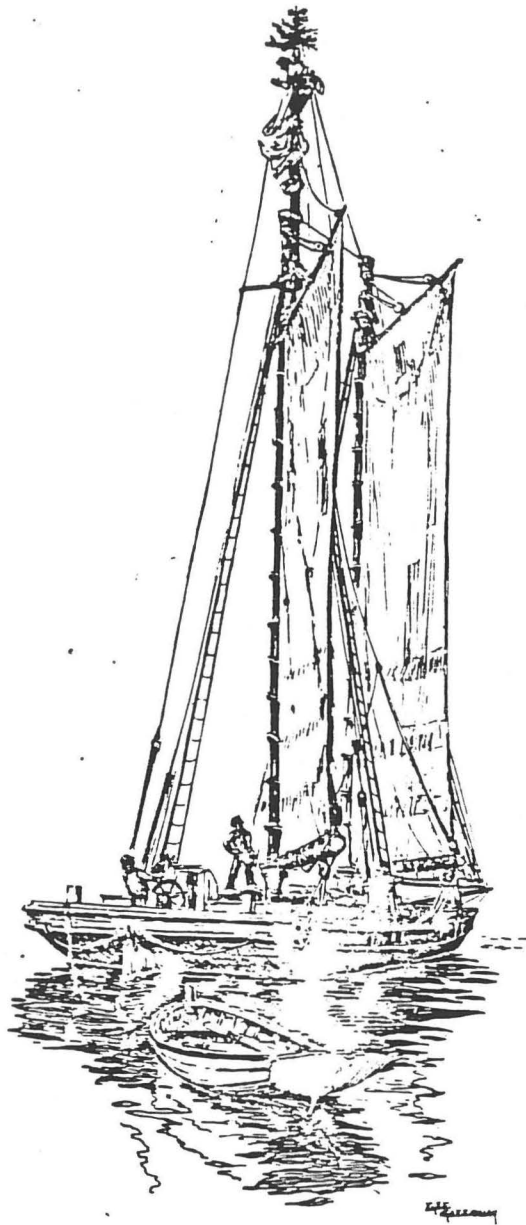
"The Friends of ALMA"

Cy Lee, Commodore

BEFORE YOU GO

The Bay of San Francisco is cool and windy almost year round. On board ALMA there is little room below decks for shelter, so proper clothing is essential. On board a working vessel is no place for style -- be practical, wear clothing that is loose enough for free movement, yet warm. Plan clothing which can be worn in layers so it can be added to or taken off for comfort. A warm sweater and windbreaker type of jacket is highly recommended, as is wool clothing and a watch cap (a knitted cap that is tight fitting). Soft shoes - ones with non-skid soles, or tennis shoes should be worn. Salt spray, rain and or heavy winds can make you uncomfortable, so come prepared.





FIRST THINGS FIRST

Safety Rule

1

LISTEN TO THE ORDERS
of the CAPTAIN AND
THE MATES

OBEY THEM!

SAFETY AT SEA IS GOOD
SEAMANSHIP.

— SAFETY —

~~Due to ALMA's size and heavy gear~~ ~~Order and discipline among her crew and passengers is a must, to insure the safe conduct of the vessel. In order to achieve this pay attention at all times.~~ ~~Be aware of orders from the Captain and Mates, for they are in charge of the vessel.~~ ^{on Alma is} ^{Saf operations of the}

Order and discipline on Alma is a must at all times. Due to her Heavy Rigging an Accident could result in a serious injury or even death. In order to insure safe conduct of the vessel pay attention at all times.

AN ACCIDENT AT SEA

CAN RUIN YOUR WHOLE DAY!

HAVE FUN... BUT BE CAREFUL

Safety Rules - 'Don't's'

DO NOT ENTER THE ENGINE ROOM

DO NOT CLIMB THE RIGGING

DO NOT RUN OR SHOVE

DO NOT SIT ON THE RAIL

DO NOT CONGREGATE ON THE AFTERDECK

As a trainee aboard ALMA you will be required to follow all safety rules and see to the safety of all passengers and visitors on board.

^{The Officers}
The Captain and Mates are responsible for the safety of the ship and all persons on board. They are in complete command of the ship and must have your complete respect and attention when orders are being given. Do not bother the Captain with questions about the operation of the station to which you are assigned -- KNOW THE CHAIN OF COMMAND -- work closely with your Mate.

TO REPEAT SAFETY RULE 1

LISTEN TO THE ORDERS OF THE CAPTAIN AND MATES -- AND OBEY THEM !

THE CREW

Each and every crew member is responsible for the safety of the ship, fellow crew members, and any visitors on board. It is the duty of all crew members to see that the ship is kept neat and clean at all times -- SHIPSHAPE! Lines will be made-up and stowed when no longer needed and working areas will be kept neat and orderly at all times. A clear, orderly working area is a safety must.

Some men compare the sailing of the sea to a game of chess -- The only way to be safe is to be several moves ahead.

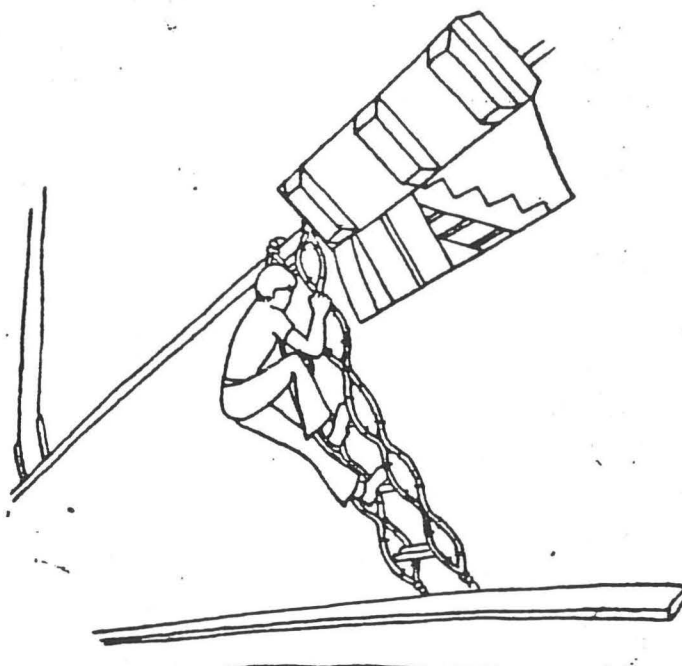
Safety is more than knowing what to do -- you must be aware of your environment (the ship) and the processes which affect her -- anticipation, prevention and common sense will make an outing ^{more} ~~not only more~~ fun but SAFE.

Carelessness and over confidence are the major causes of accidents. The ALMA, especially for the novice sailor, can be a dangerous place. Do not become a victim. Be careful and you will be safe.

ALWAYS
WHY IS IT THERE IS ENOUGH TIME TO DO IT TWICE WHEN THERE IS NEVER ENOUGH TO DO IT RIGHT THE FIRST TIME?

- BOARDING -

One of
Probably the most dangerous activity of the day is getting on board the
~~when usually~~ ^{the} ALMA. She lies along side the THAYER, ^{so to board here everyone} one must climb down a pilot ladder
~~on the side of the Thayer.~~
~~To avoid being injured one must~~ Be aware that these ships are afloat and
are moving at all times, So never place any part of your
body between the Two ships.



~~NEVER PLACE ANY PART OF YOUR BODY BETWEEN ALMA AND ANY THING ELSE!~~

Hang On Tight. !!

BOARDING PROCEDURES:

1. Single file at the boarding station
2. Sign in. ~~(only senior crew members should be aboard at this time)~~ A crew member will be there with the log -- otherwise wait before boarding.
for an officer
3. Pass your gear aboard
4. Board as instructed by the boarding officer.
5. Report to the mate for assignment.

ON Being A Crew Member

~~ILLUSTRATION - WOODS PRINT.~~

~~CREW AT WORK ON
OLD STILT~~

Crew members Have a Responsibility, etc

~~CREWING RULE~~

An individual does not make a crew the crew is made up of individuals who work in unison to accomplish a common goal. Teamwork is essential, and every individual must be a responsible part of the team. Each crew member must be aware of every other crew member and their responsibilities so that the whole crew can act as one unit. Orders ~~must~~ be carried out without question or discussion. There is only one Captain and his word is law. The Mates and other adult crew members are following his orders and the crew will follow their directions. The safety of the crew and the ship is at stake, so do not endanger your companions.. Be ware of their work too -- don't let their safety ignorance endanger you!

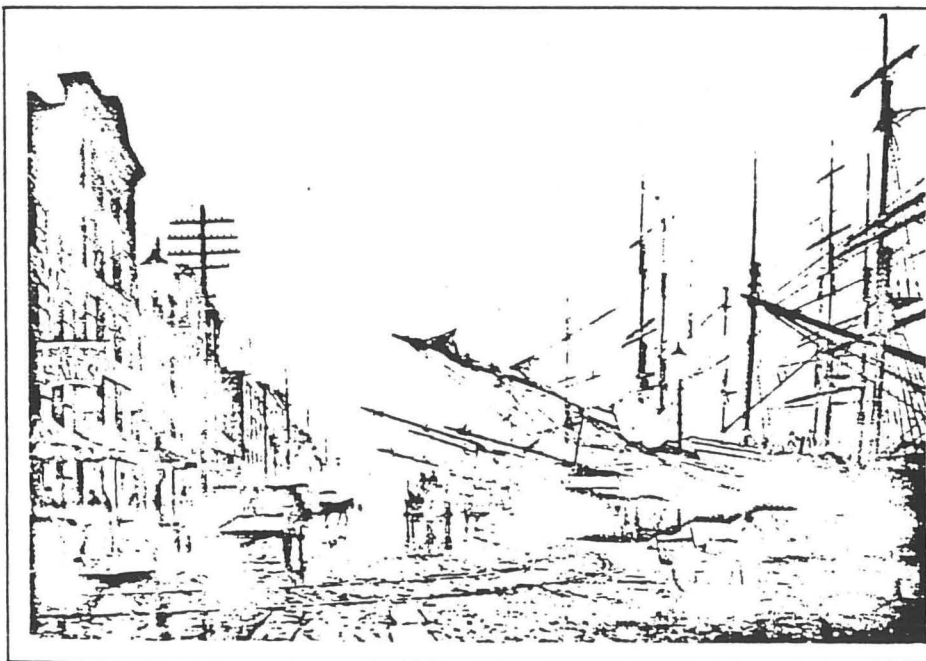
There will be ^{free} ~~periods~~ when individuals and crews will have free time; however, crew members' responsibilities do not stop when there is not specific work to be done. Crew members should be alert at all times for changes which affect the ship or their duty station. Dangerous situations can develop while the ship is under weigh -- so BE ALERT FOR TROUBLE!

(CREW MEMBERS HAVE A RESPONSIBILITY TO THEMSELVES, THEIR FELLOW CREW MEMBERS, AND TO THE SHIP.)

VISITORS

There will be occasions when there will be visitors on board. All crew members are responsible for the safety of these persons.

Visitors will be treated with respect at all times by all crew members. Visitors do not normally have a knowledge of the dangers that exist on board a vessel like ALMA. Crew members will advise any visitor of changing conditions which might affect them. Many visitors will want to know more about ships and sailing. Crew members will try to answer their questions or direct them to someone who can. In general, it is the crews' responsibility to help these visitors ^{the best} ~~in every way possible~~ and make ~~the~~ welcome on board.



What to Do in Case of
Emergency

ALL CREW MEMBERS SHALL REPORT TO THEIR DUTY STATIONS AND AWAIT FURTHER ORDERS

YOUR LIFE AND EVERYONE ELSE'S ON BOARD MAY DEPEND UPON YOUR ACTIONS
THE SHIP MAY HAVE TO MANOUVER AND EVERY MEMBER OF THE CREW WILL BE
NEEDED TO CARRY OUT THEIR DUTY ASSIGNMENT -- STAY CALM AND KEEP YOUR
HEAD. OTHERS ^{will be depending on you} ARE ~~DEPENDING~~ ON YOU.

REGULATION — WOODEN

SHOULDN'T ON FIRE WOOD BUT OR
OIL

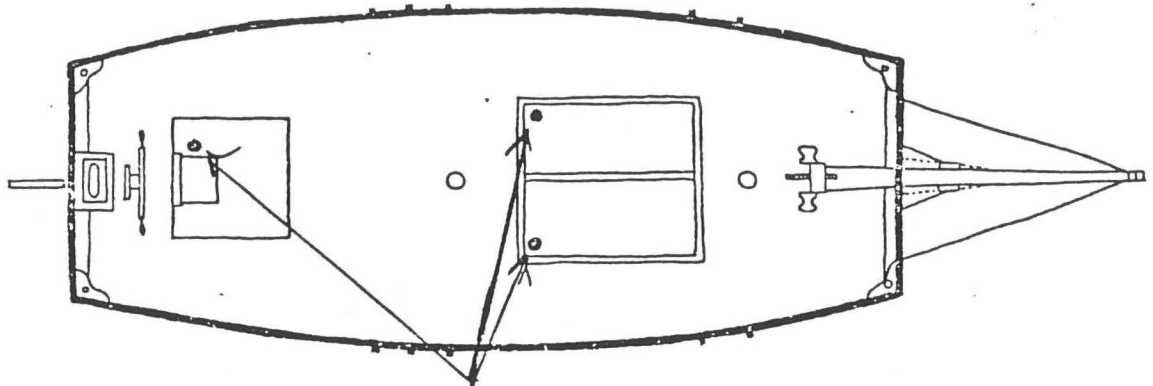
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FIRE!

Probably the most dangerous situation that could exist on any ship
is a fire. The best way to fight fire is to prevent it from starting.
Dirt, oily rags, etc., are fire hazards, and should not be allowed
to collect. People who smoke should use extreme caution, particular-
ly when cleaning fluids or solvents are being used, Care is also
needed when ever extinguishing ^{Tobacco} ~~smoke~~. Remember the deck and caulking
^{is} ~~are~~ ^{slowly} with the rest of the ship is
flamable.

Should you see a fire hazard -- report it to the Mate in charge of

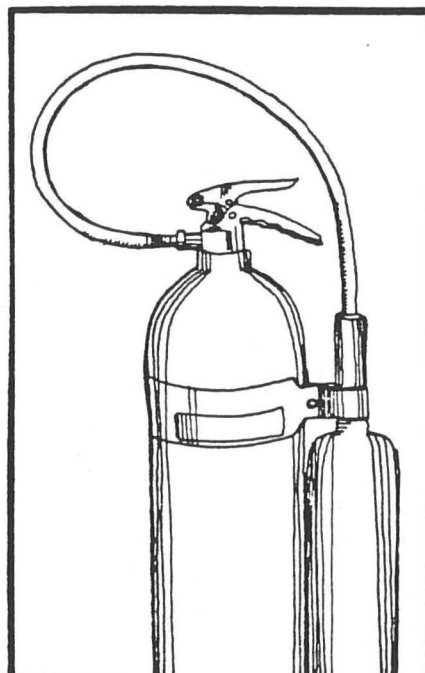
There are three fire extinguishers on board the ALMA. One in the cutty next to the ladder, on the port side ; and one in each hold, next to the ladders, on the outboard side.



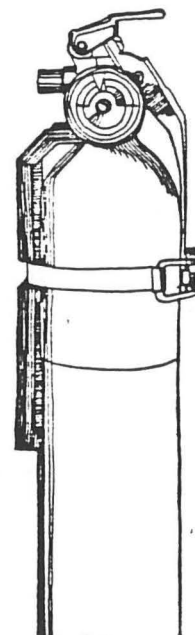
EXTINGUISHER LOCATIONS

These are of the type that can be used on all three classes of fires-- preferably by an adult crew member. There may be cases when an adult may not be able or available to do so, so you too should become familiar with the equipment.

Carbon
Dioxide



Dry
Chemical



Go below decks and examine the extinguishers on ALMA. Read the instructions on one of them before it is needed in an emergency.

Basically all extinguishers are operated in the same manner: Remove it from the hanger. Near the handle there will be a pin and cable seal. Remove this and the extinguisher will be ready for use.

Approach the fire getting as close as possible without endangering yourself. Keep low -- remember heat and poisonous gasses rise.

Aim the nozzle at the base of the flames where the combustible material is, and using short bursts (all extinguishers have a limited capacity!) cover the material involved. After the fire is extinguished, stand back and away from the area. There may not be enough oxygen to breathe in an enclosed area. Only if the fire restarts should you repeat the process. FIRE EXTINGUISHERS HAVE A VERY LIMITED SUPPLY OF MATERIAL -- USE IT SPARINGLY.

(New Page)

MAN OVERBOARD:

If you see a person fall overboard, call out "ALMA -- MAN OVERBOARD!!"

On the deck next to the hold on the port side, there is a life ring and buoy.

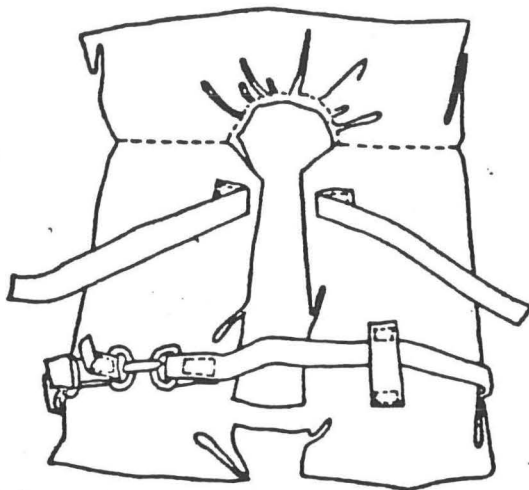
ILLUSTRATION - ~~MAN OVERBOARD~~

↓
RING & BUOY

Upon hearing the call "ALMA -- MAN OVERBOARD" the closest person to the ring will throw the assembly over the side. It is not essential that the buoy be thrown at the person in the water -- it is essential that it be thrown in their general direction -- AS SOON AFTER THEY GO IN AS POSSIBLE. Remember, the ship is moving away from the point where the accident occurred. A float in the general vicinity will help the Captain locate the swimmer, while at the same time giving the victim something to cling to.

YOU MAY ONLY NEED IT ONCE

(New Page)



If you should find yourself in the water -- KEEP CALM. Look for the ring buoy and swim to it. DO NOT TRY TO SWIM AFTER THE SHIP, OR GRAB ANY PART OF IT! Should you find swimming too difficult, remove some of your clothing, and continue to move toward the ring. Once there, relax, ALMA WILL COME TO YOU as soon as possible.

last
Page

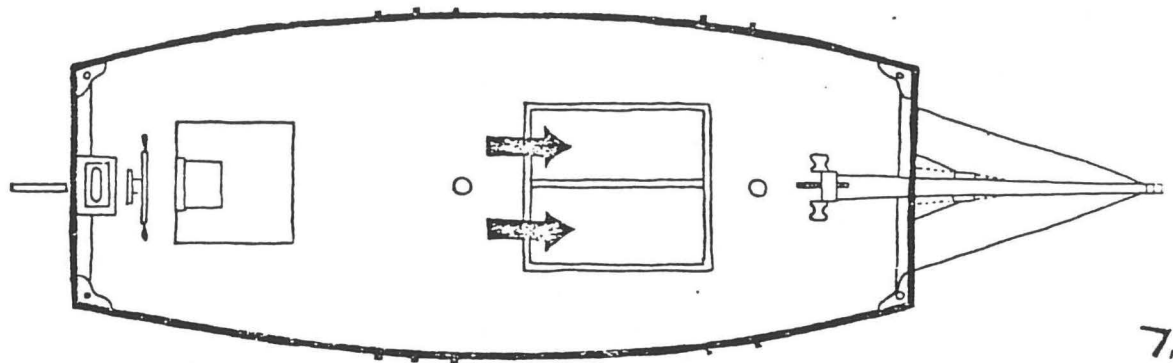
As the ship draws near, listen for orders from the Mate or Captain. Do not try to climb on board -- a line with a loop in the end will probably be passed to you. If so place the loop over your shoulders and under your arms. You will be hoisted on board clear of the sides. Be prepared to fend yourself off as you are lifted from the water.

PERSONAL FLOTATION DEVICES (PFD's)

A personal flotation device is carried for everyone on board -- just as the ship is a life support system so PFD's are the persons back-up. A look at the way ALMA is constructed will show you that she will not sink easily. Her heavy wood beam construction will keep her afloat for some time; however, PFD's are an important part of safe boating.

At the park you will have an opportunity to practice putting on a PFD properly. With the type shown, slip the device on, The lower strap goes around your body, and is fastened first. The upper strap is then adjusted. Notice how most of the flotation is in the front? In case the victim loses consciousness this will keep their head out of the water. It is important that the straps are adjusted tight enough that you won't slip out when you hit the water.

A PERSONAL FLOTATION DEVICE IS EMERGENCY EQUIPMENT --NEVER USE IT AS A CUSHION -- ALWAYS TREAT IT WITH RESPECT.



ALMAS' personal flotation devices are stowed in appropriate stations aboard the vessel. Whether in drills or an actual emergency, ONLY MATES WILL HAND UP THE PFD'S. Crew members shall report to the Mate in charge of the operation to receive the device, and then report as directed (usually to your duty station).

INJURIES:

Should someone in the crew become injured, Report it to the Mate immediately. Even the slightest injury should be reported for the record. Should a mate become injured, report this to the other Mates or the Captain.

After reporting an injury, emergency conditions may prevail (depending on the nature of the injury). Stay clear of the area by returning your attention to the ship and your duty station. The adult crew will need room to deal with the injured person.

COLLISIONS:

In the event of a collision, report to your duty station and await further orders. DO NOT leave the ship unless the Mate or Captain direct you to. Stay clear of the damaged area, and clear of the other vessel. Keep a lookout for other persons in the water, for a good jolt could knock people overboard. If there are injuries, report them to the Mate -- DO NOT MOVE THE INJURED PERSON.

Be prepared to lower sails by staying near your duty station. There may be need to maneuver ... keep calm ... and listen for orders.

If we abandon ship, remember the PFD drill. Once in the water, swim clear of the ship, and wait. DO NOT TRY AND SWIM TO SHORE! Stay in the area, and try to group up with the rest of the crew.

PHOTO OF BOAT IN TIGHT
QUARTERS OF THE BAY

FALLS:

ONE HAND FOR THE SHIP AND ONE HAND FOR YOURSELF is still an apt proverb today -- especially on ALMA where the slow wallowing movement can catch you off guard. Any time you are in an unstable position - whether it is because of work you are doing, when you are leaving ship, or simply going below decks - always maintain a good hand hold. It is always a good idea to check what you are holding on to -- it won't help break your fall if it can't support you.

Wet decks are, by their nature, slippery. Use care, and be aware of fittings and lines on the deck. Ladders too can become slippery as they pick up moisture from foot traffic, and spray. Use caution and keep a good hand hold when using them.

CHAPTER II

SOME

THINGS

20

(Next Page)

Explanation of using Nautical Language and
the need of the Student to learn it!

MARLIN SPIKE
SEAMANSHIP

The marlinspike is the Basic Tool
that is used on Rope and line. Thus
marlinspike Seamanship ~~is about~~ Rope or line and
how to use it.

For many years sailors were ~~completely~~ dependent on the lines (ropes)

which harnessed the sails, ~~provided~~ ^{that is} the driving force for their
ships. ~~As men progressed, he applied steam and then~~
~~With the coming of steam to the seas, man's knowledge of masts,~~
~~engines to ships, lessening the importance of sails and~~
~~the proper way to rig them and the sails they carried was no longer~~
~~ropes.~~ Today, as we look back and realize that ~~it is~~ ^{some of the}
~~knowledge of the past might be of great value today and~~
~~almost too late to save all but a few examples of the days of sail,~~
~~in the future, the Alma program is based on these,~~
~~we must also face the fact that the men who learned these arts are~~
~~also almost gone.~~ and with them the ARTS OF THE SAILOR.

The Alma is a floating museum with many fine examples
Not completely gone, ~~there are~~ some excellent examples of their
~~of the ways sailing ships were rigged and fitted out~~
handwork, and with many fine examples of that handwork aboard
~~at the turn of the century.~~ But most of all
ALMA we have an excellent area to study them ~~for her rig calls~~
~~she calls out for new generations to work~~
~~for sailors to handle it.~~
her rigging and sail her once again.

Marlinspike Seamanship is what it was called. Rope (and a trusty
marlinspike) is what it deals with.

What is Rope?

(~~What is rope, anyway?~~

- ROPE -

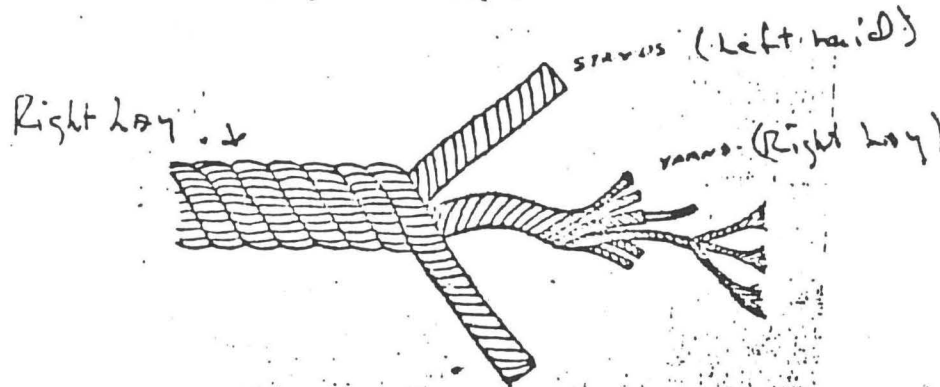
Rope is defined as cordage of all types, but rope is called LINE when it is used on a vessel or boat. This ^{Discriptive Term.} ~~usage~~ holds true no matter which part of the rigging ^{the line} ~~is~~ is used in. The only ropes not on a vessel are those which are ^{not} directly involved in the operation of the ship, yet are still needed. For example, foot ropes (to walk on), bell ropes (to ring bells with), or bucket ropes (with which to fetch sea water).

Rope is one of the most remarkable products known to mankind. It is a simple thing, a handful of twisted fibers whos' origins are lost in the beginnings of history. Through out the centuries man has improved ropes strength, quality, uniformity, and life, yet through the thousands of years of use it remains essentially unchanged.

The most common type of line on ALMA is MANILA rope. Manila is made from the fibers of the Abaca plant which is native to the Philippine Islands. Most of the line on ALMA is THREE STRANDED, RIGHT HAND LAID MANILA.

Answer - Cordage

A look at the construction of a piece of manila will help you understand the terms "STRANDS" and "RIGHT-LAID". A three-strand, right-laid rope has three major parts (or strands) which spiral around each other to form the body of the rope.



Now, take a look at one of the strands. As you unlay it you will discover that it is made up of several parts that are twisted to the left. These are the rope YARNS. The reversed lay of the yarns and strands gives rope its strength, for, as it is pulled in one direction it tightens in another.

If you go even further and take apart one of the yarns you will discover it is made up of individual fibers which are laid to the right.

THE LAY OF A ROPE IS DETERMINED BY THE LAY OF THE STRANDS.— ITS STRENGTH AND RESISTANCE TO STRETCH IS DUE TO THE OPPOSITE LAY OF THE FIBERS, YARNS, AND STRANDS.

OTHER TYPES OF ROPE

Rope is classified by the type of material it is made of. Thus if you look in a catalog of rope you would find names like Manila, Sisal, and Hemp (all plant fibers); Nylon, Dacron, and Polypropylene (all synthetic fibers); and Wire rope (of various types -- all made from twisted

twisted wire. Each of these has its own advantages and disadvantages. Synthetic rope is the most popular today because of its superior strength, resistance to rot, and light weight.

Besides the traditional manila line used on ALMA, you will also find some polypropylene (used for heavy lifting), wire (used in the standing rigging), and occasionally a piece or two of BRAIDED (or double braided) line.

HOW STRONG IS IT?

The strength of a line is affected by its size, ^{and composition} ~~measured by its circumference in some circles, but by diameter for ours~~ ^{Line is measured by its diameter. The strength is measured across} and its composition. The following chart will tell you more about different

types of line.	MANILA	NYLON	DACRON	POLYPROPYLENE
Size in Inches	Recommended Working Load 20% of Breaking Test	Recommended Working Load 11% of Breaking Test	Recommended Working Load 11% of Breaking Test	Recommended Working Load 17% of Breaking Test
Dia.	Breaking Test, Lbs.	Breaking Test, Lbs.	Breaking Test, Lbs.	Breaking Test, Lbs.
3/16	405	1,000	1,000	800
1/4	540	1,650	1,650	1,250
5/16	900	2,550	2,550	1,900
3/8	1,215	3,700	3,700	2,700
7/16	1,575	5,000	5,000	3,500
1/2	2,385	6,400	6,400	4,200
9/16	3,105	8,000	8,000	5,100
5/8	3,960	10,400	10,000	6,200
3/4	4,860	14,200	12,500	8,500
13/16	5,850	17,000	15,500	9,900
7/8	6,930	20,000	18,000	11,500
1	8,100	25,000	22,000	14,000

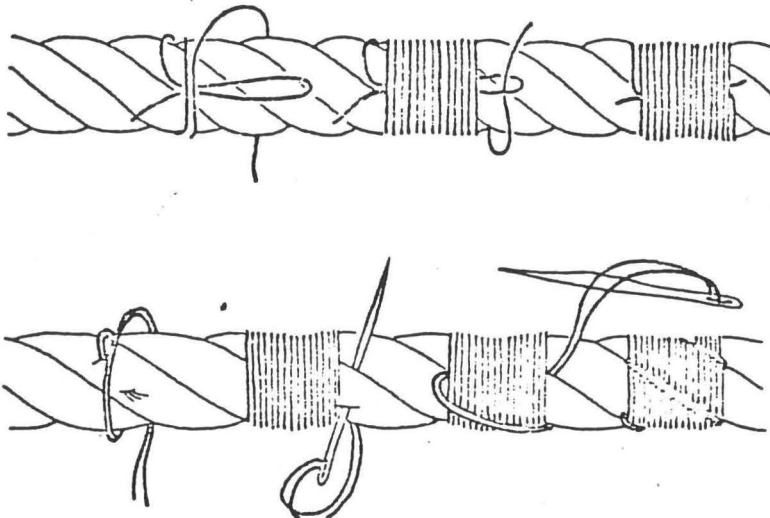
	MANILA	NYLON	POLYPROPYLENE	POLYESTER
BUOYANCY	Negative	Negative	Positive	Negative
SHOCK ABSORBANCY	Poor	Excellent	Very Good	Good
STRENGTH (Elongation)	Low	High	Lower than nylon, higher than polyester	Moderate
RECOIL (Snaps Back)	Slowest	Fast	Slow	Slower
RECOVERY (Returns to Original length)	Fair	Best	Fair	Good
TEXTURE	Coarse when new	Fair	Very coarse	Good
RESISTANCE TO ABRASION	Good resistance, inside & out	Very good outside, excellent inside	Fair, inside & out	Best, inside & out
RESISTANCE TO MOISTURE	Poor (shrinks when wet)	Good	Complete	Excellent
RESISTANCE TO ROT, MILDEW, DETERIORATION CAUSED BY MARINE ORGANISMS	Poor	Excellent	Excellent	Excellent
RESISTANCE TO SUNLIGHT	Good	Good	Good; black best	Excellent

CARE OF ROPE

Laid rope will come undone at the ends if not protected. To prevent "cows tails" (frayed rope ends) and to make the rope easier to use we WHIP the ends. Whipping is done whenever a fresh piece of line is cut, or whenever a line loses its' whipping.

The whippings illustrated below can be done with either sail twine or a special type of string (marlin). Both are simple to make, and with a little practice can be done quite quickly. The first, or TEMPORARY WHIPPING is good in an emergency when there is not time to get a sail-makers palm and needle, but as the name implies, will be only temporary (it pulls off the end easily).

The second, or NEEDLE WHIPPING should last the life of the line, for as the whipping is finished, the needle passes through the line, marrying (or making a permanent part of) the whipping to the lines' end.



All whippings are basically the same: a series of turns are taken around the line -- AGAINST (or in an opposite direction to) THE LAY OF THE LINE. A few hints on whippings which might help you are: Start an inch or so from the end (the excess can always be trimmed off), make the whipping as wide as the diameter of the line, and make the turns as tight as possible.

CARE OF LINE

Line is of vital importance to any ship. It must be taken care of, and kept ready to use at all times. Knots and tangles must be avoided when we are sailing, for a fouled line can spell disaster (or at least danger to ship and crew). At all times lines will be stowed by either COILING, FLEMISHING, OR FAKEING. All lines must be ready to use, and stored in a safe and proper manner.

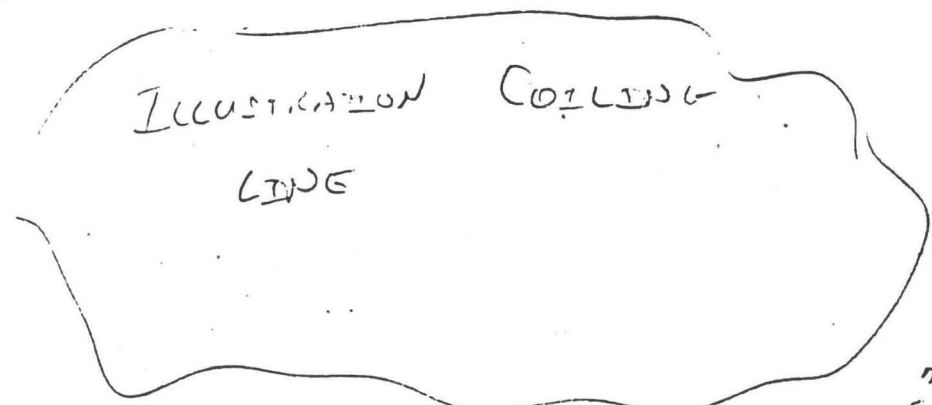
TO COIL A LINE:

ALWAYS COIL WITH THE LAY OF THE ROPE. Since most of ALMAS' line is right-lay, it is coiled to the right (in a clockwise direction). Begin at the fixed end of the piece to be coiled (the end that is tied to something) by taking a BIGHT (a section or loop of line), and bringing one hand to the other forming a clockwise loop. It may help to give the line a quarter or half twist to the right (with the lay). This will help the line to lay in the coil. Take another, and another until the other end is reached making sure each bight (loop) is the same length.

A coil of line will grow heavy quickly, so with a longer piece it may be best to start on the deck rather than in one hand.

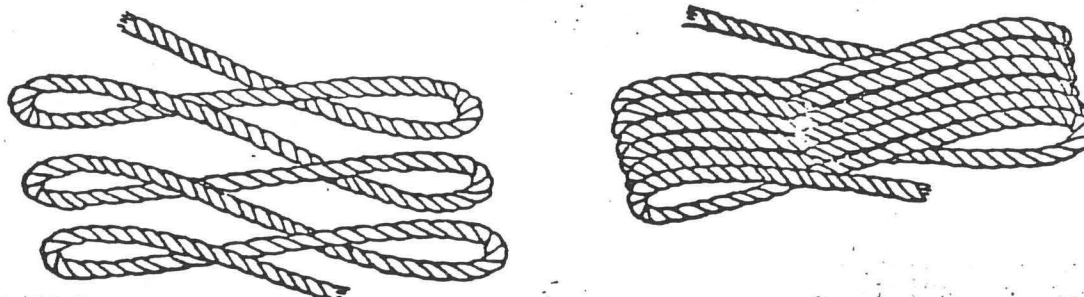
DON'T FORGET WHICH END IS THE WORKING END -- IF IT IS ON THE BOTTOM AFTER YOU ARE THROUGH TURN THE COIL OVER!

ILLUSTRATION COILING
LINE



To Fake a Line
Faking is for lines that have to be free to run at any given moment.

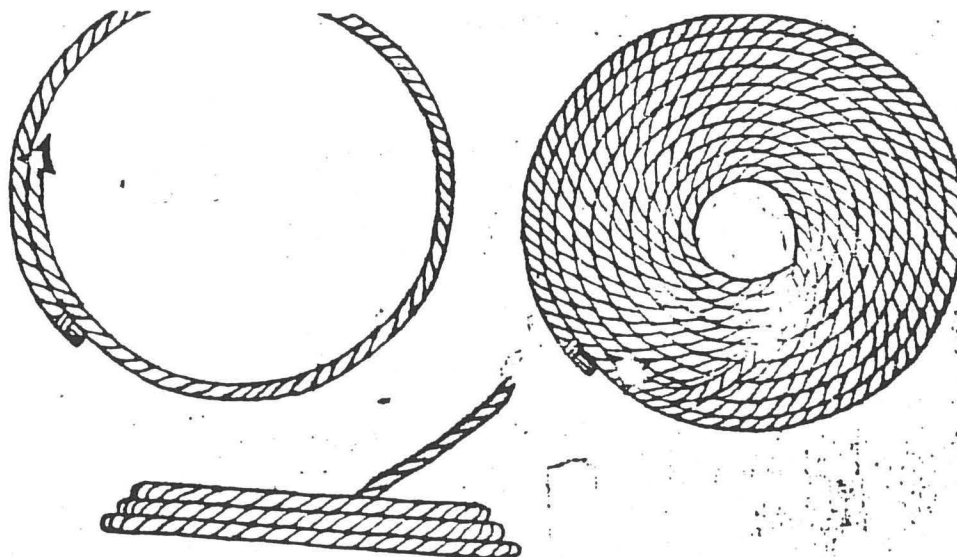
A fake is a carefully made flattened coil that is laid out on the deck. Each bight is turned back into itself insuring that there are no overlaps to tangle. Lay out several bights of equal length and then pull them in close to each other to make the fake have a mat-like appearance. Continue the process until the whole length of line has been faked.



TO FLEMISH A LINE:

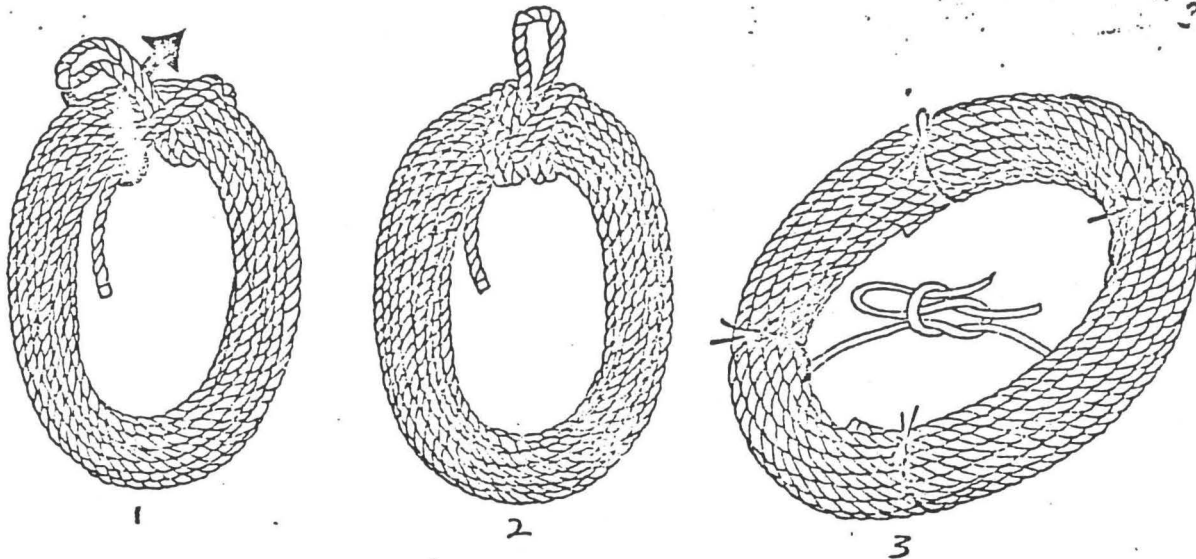
Another way to make a line ready to run is to put it in a flemish coil. It is easy and looks good. To start, make a large clockwise coil (right lay rope), and coil toward the center, with each turn laying neatly inside the previous one. If needed, several layers can be made (see illustration).

A flemish can also be made by starting in the center and working out. This is a much quicker method, but the line is not as free to run.

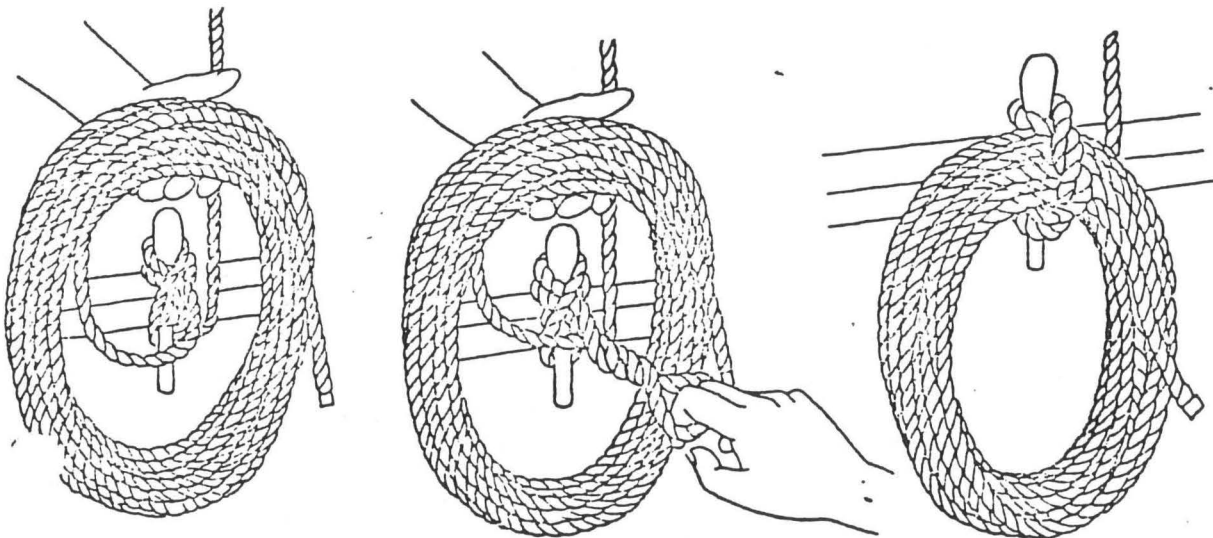


STOWING LINE

There are many methods of securing a coil of line prior to storage. The illustration below shows how a coil can be prepared to hang on a peg. (numbers 1, and 2). The third drawing shows how larger coils of line should be handled. Four ties are used to secure the coil and help prevent fouling (tangles) after storage. THIS IS THE METHOD USED TO STOW ALL SPARE LINES ON ALMA.

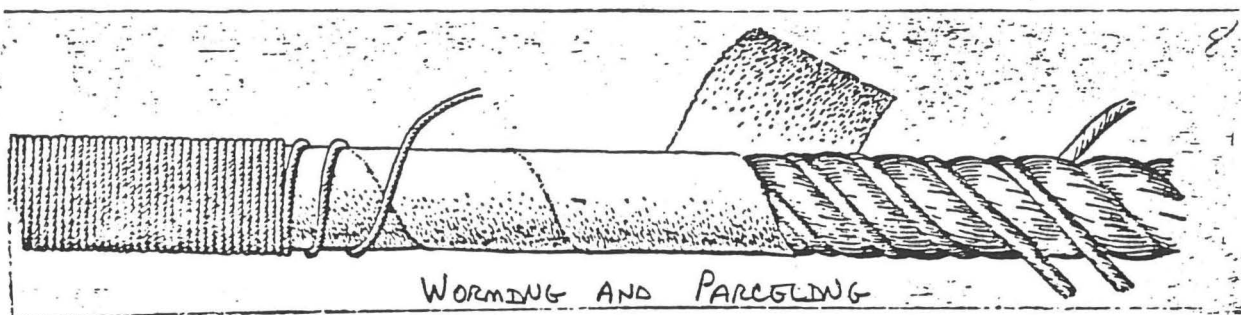


The drawings below show how to care for a line that is bent (tied off to) a belaying pin. After the line has been made fast, a bight is taken about a foot from the pin, and twisted. The resulting loop is slipped over the top of the pin, and the line is secure.



CHAFFING GEAR:

Rope is a sizable investment on any boat, and represents an investment which can be protected through proper care. One of the greatest dangers with rope is chafe. ^{Line}↑ chafes when it rubs against something else, causing the fibers to break, and wear away. WORMING AND PARCELING is the most permanent chaffing gear, but it is a time-consuming process.



Most of the lines subject to wear by chafeing on ALMA are protected by a less permanent type of gear. Usually scraps of canvas, or carpet are lashed to the line where contact is made. These work well, are fast, easy to apply, and inexpensive.

ILLUSTRATION LIFTING LINE
TO A HAWSE.

— KNOTS —

What good is a piece of line if you can not use it? If you don't ~~know~~^{know} how to tie it to something? This is hardly the place to put a thorough reference on knots -- there is not room -- instead the following knots are a recommended place to start.

After you have mastered these knots you may be interested in learning a few more. The park has some excellent references on hand, and there are numerous books on the subject readily available.

A sailor's life often depends on his ability to judge which knot to use in a given situation, and his skill in tying it, for oftentimes it must be done quickly -- without hesitation or mistake. A good sailor would practice his knots until he could tie them in the dark -- he very often had to. A sailor's ability with knots reflects his abilities as a sailor -- every sailor should take pride in the knowing the correct knot for the situation, and the ability to make it quickly and properly.

THE BOWLINE

is probably the quickest, most reliable way to tie a loop in the end of a piece of line. It is dependable, strong, and easy to untie. You will find many uses for the bowline on ALMA.

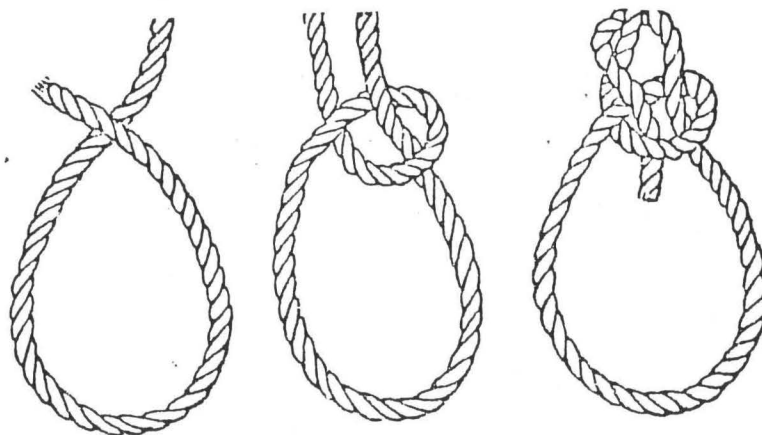
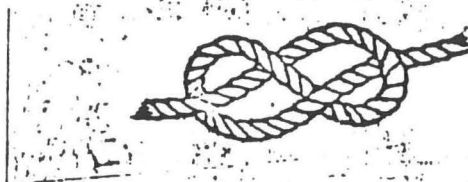


FIGURE EIGHT KNOT -- is used on the end of a working line to prevent it from passing through the opening through which the line passes. A figure eight might be used to prevent a line from passing through a block.



THE SHEET BEND -- is the utility bend, which is used (among other places) to tie different lines of the same size together. It is similar to the bowline in dependability, and to a square knot in style.



THE DOUBLE BECKET HITCH (double sheet bend) -- is generally used to fasten two lines of different size together, or to fasten a smaller line to the spliced eye of another. It is more secure than the sheet bend.



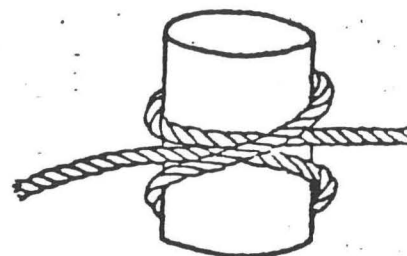
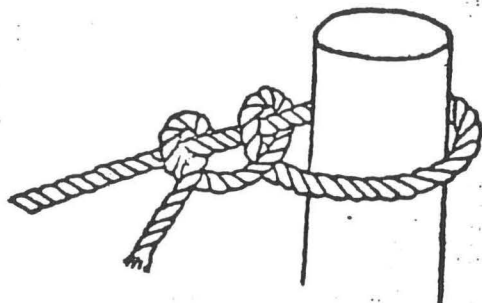
THE CARRICK BEND -- is useful when tying two large lines together. It also works well on smaller stuff. It is one of the best methods of joining two lines together.



M

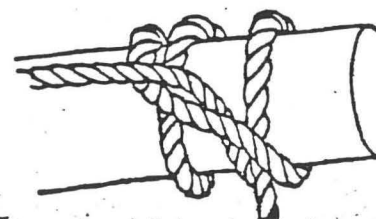
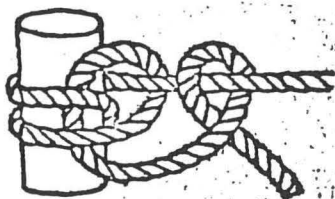
31

TWO HALF HITCHES -- a fast temporary way to tie a line to a spar or pole. Be careful, two half hitches can -- and will -- work loose.



CLOVE HITCH -- is another way to make a line fast to a spar or pole. Like the half hitches, it too is subject to slippage. A half hitch can be added as an additional safety measure.

ANCHOR BEND (fishermans bend) -- is a better way to fasten a line to a pole or ring. It can be made permanent by siezing the loose end to the standing part (the part of the line that goes to the load



ROLLING HITCH -- is a knot similar to a clove hitch, but is used when a lengthwise strain (pull) on the spar or pole is needed (in other words, the load on the line is paralell to the pole). The rolling hitch can also be used to fasten a line to itself, or another line.



THE STOPPER KNOT -- is really a hitch, but is good to use when there is nothing to tie to but the line itself. It works best when there is a strain on it, and should always be followed by a half hitch (see step 3)

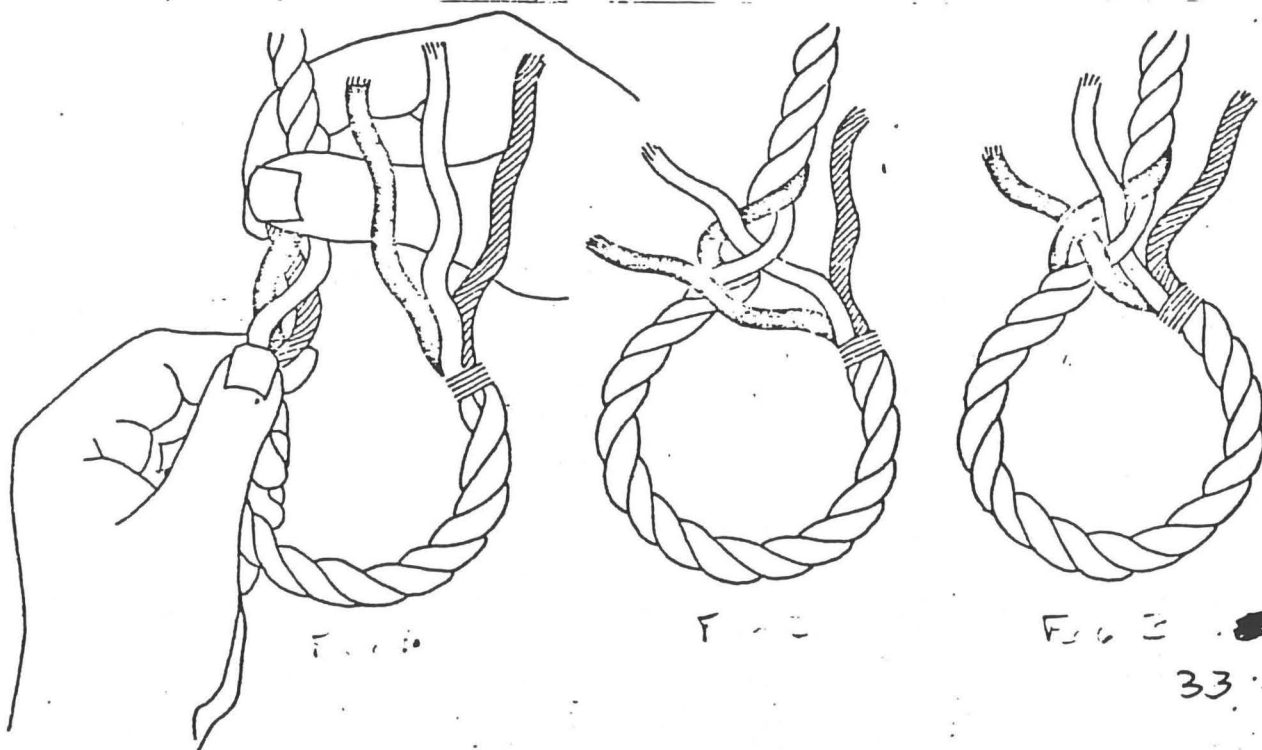
SPlicing

Whereas knots are a temporary means of joining a piece of line, a splice is a permanent bending of line or lines together. Splicing has one great advantage over knots: A knot will reduce the strength of a line up to 50%; a splice, properly made, retains up to 95% of the original strength of the line. When ever possible splices should be used.

EYE SPLICE

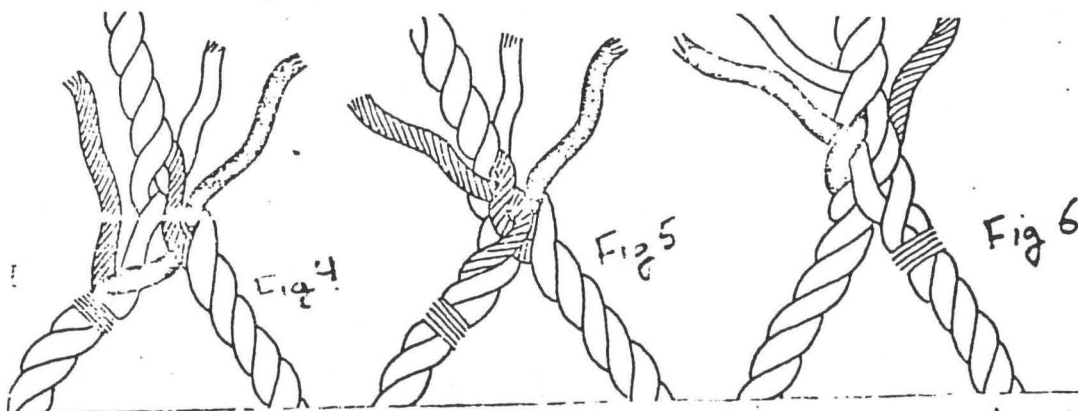
Anyone can make a good splice. They are simple, but it takes a little time and a lot of practice. On this page and the following, are step-by-step diagrams which, if followed correctly, will produce a trouble-free splice. We shall refer to the BLACK STRAND as STRAND "A", the WHITE STRAND - "B", and the cross-hatched as STRAND "C".

To start any splice, take the end and measure in about 6 inches (for $\frac{1}{2}$ inch rope). Make a whipping at that point. Then unlay the ends up to the whipping. Now whip each individual strand. You are now ready to begin the splice. Measure the size of the eye that you want.



At that point, begin the splice by opening the line with a twisting action against the lay (fig. 1). Next you take the strand "B" which is the center strand (coming out of the whipped end) and tuck it under the center strand of the line (fig. 2). Pull it tight so that the whip is close to the line. Next take strand "A" and tuck it under the strand in the line which is next to the center strand, to its left (fig. 3). Be careful to get strand "A" below your first tuck. Then pull strand "A" up tight. Next you turn the splice over so you are looking at the back from where you started (fig. 4). This next step is where most people have trouble, so be careful. Take the last strand, "C", and bring it over and around the remaining strand in the line (fig. 5). It will seem that strand "C" went in backwards from strands "A" and "B", but the correct way is shown. Now pull all of the strands up tight, as tight as they will go. What you want is to close up the lay of the rope below the splice, down to the whipping. Once this is done, we can finish the splice. Starting with strand "A" go over one strand on the line and under the next. Now with strand "B", over one and under the next. Follow the same procedure with strand "C", over one and under one. Pull each of them up very tight. Now with strands "A", "B", and "C" make another tuck, over one and under the next. There you have an eye splice. With manila line three tucks are sufficient. SYNTHETIC LAID LINE REQUIRES UP TO FIVE TUCKS TO BE SAFE.

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To finish the splice (see fig. 7) strands "A", "B", and "C" are pulled tight, whipped close to the line and cut off. Always allow a tail at least as long as the rope is wide.

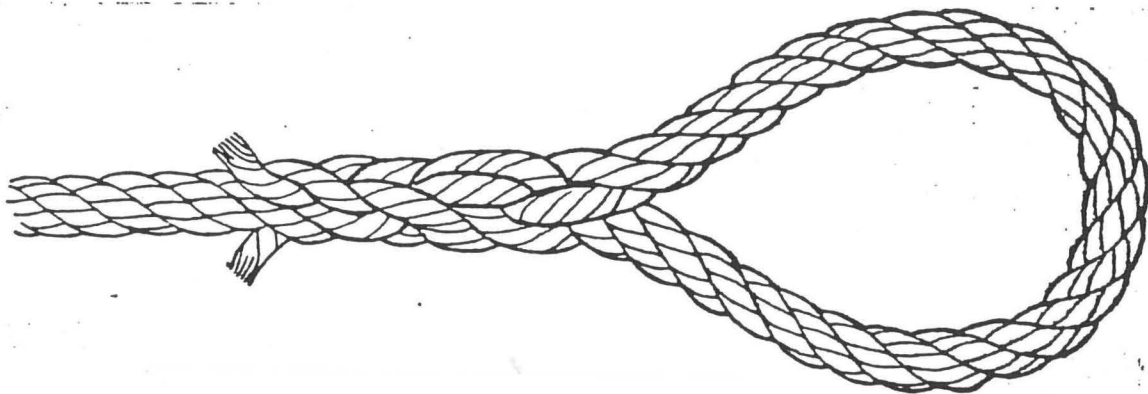


FIG. 7

A TAPERED SPLICE can be made by removing about one-third of the yarns from each strand after the third tuck, and make a fourth tuck - over one and under the next. Remove another third of the yarns, and repeat. After trimming and finishing the tapered splice has a much more finished appearance than one not tapered.

SHORT SPLICE

The short splice is one way of joining two pieces of line together, but like the eye splice it too has one draw back: it increases the diameter of the line by at least one-third. This makes it unusable on a line which passes through a block or other restrictive opening. When you have mastered the eye splice, see your Mate (or the parks' reference books) to learn the short splice.

LONG SPLICE

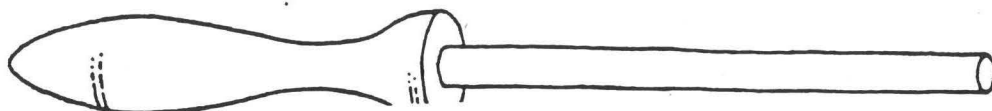
This splice is also used to join two pieces of line together. It is not as strong as a short splice (when done properly it will retain 75% of the lines strength), but has the advantage of being of smaller diameter, thus allowing its use in a block and tackle. Again, see your Mate when you are ready to learn the long splice.

SEVERAL WAYS TO MAKE A LINE FAST

To secure a line means to make it fast, to fasten it to something, to stop it from running. On a sailing ship, lines are the link from the sailors to the sails and rigging, so through the centuries, many methods of securing a line have been developed.

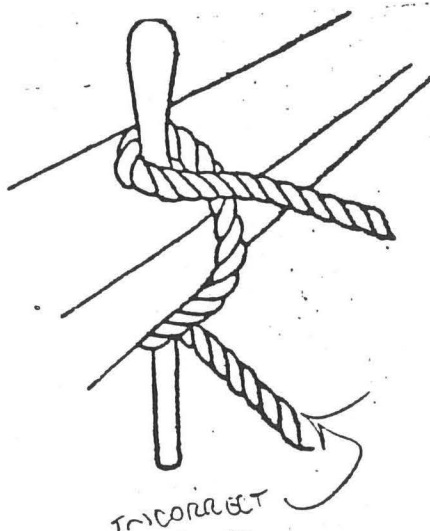
BELAY

To belay means to tie off, to make fast. Its name is derived from a device which is common many sailing vessels, and which is used extensively on ALMA. The BELAYING PIN is a portable device which



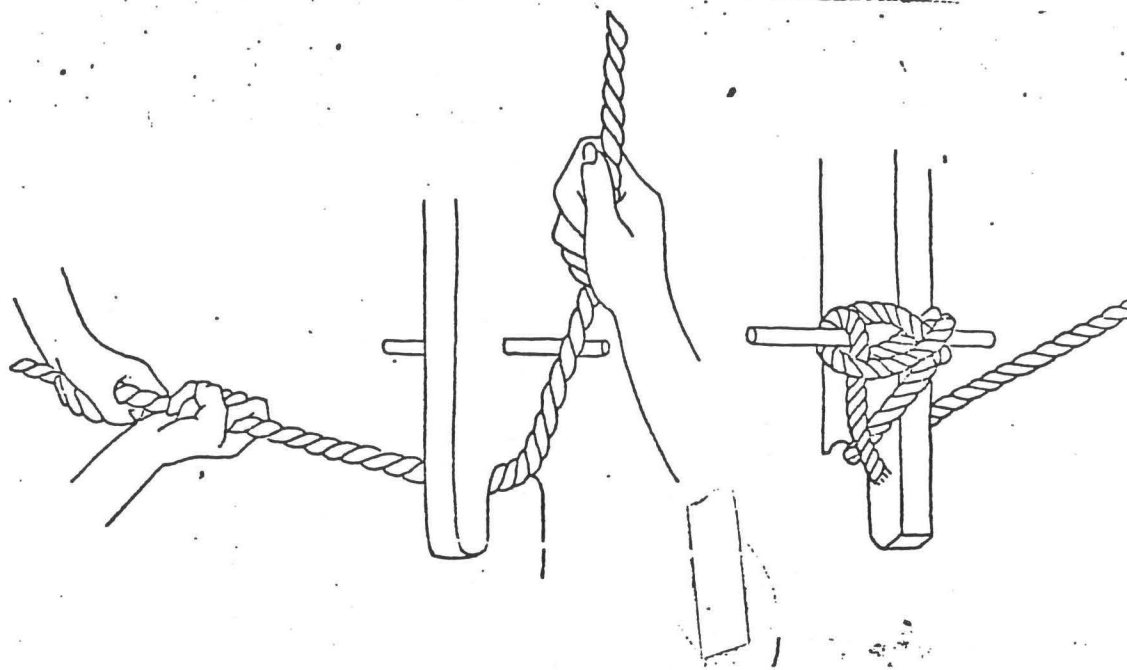
when inserted through a rail (PIN RAIL) or other solid structure provides a good place to secure a line.

To belay to a pin the line is wrapped in a figure-eight pattern. The friction of the line against the pin and rail provides good control when working the line. The figure below shows the way in which the figure-eight is made. Take a turn around the bottom of the pin if the strain (load) is from above; and around the top if the strain is from below. Finish with a half hitch (formed by putting a twist



in the last turn thus locking the free end).

Another device used on ALMA is shown below. It is basically a vertical pin-rail, with a notch (horn) at the bottom to help work the line. After the line has been passed under the horn, a series of figure eights, followed by a half-hitch will secure the line.



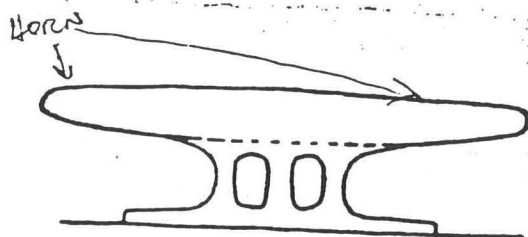
A third device found on ALMA, and used extensively around ships is a CLEAT. The proper method to secure a line to a cleat is to pass the line under BOTH horns before starting the figure-eight turns. two to three wraps (turns) will hold ~~quite~~ a load, but it is usually best to finish with a hitch to prevent slippage. ^{So} There will be times

when the Captain or Mates will direct you to tie off without the hitch.

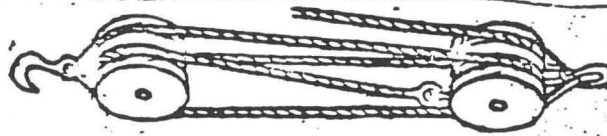
^{When} ~~if~~ the line is subject to a great deal of strain, it can pull so

tight that the only way to free it is with a sharp knife.) ^{using} When given

this ^{procedure make} ~~order~~, take a couple of extra ^{wraps} ~~turns~~ on the cleat for safety.



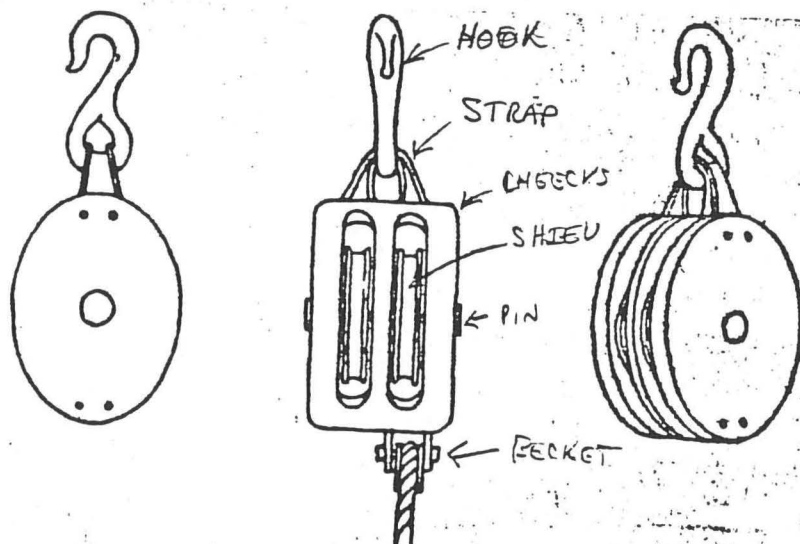
SOME SIMPLE MACHINERY



— THE BLOCK AND TACKLE —

BLOCKS

A block is a frame of wood or metal which ^{hold} ~~houses~~ one or more pullies (SHEAVES), ^{which} ~~when~~ a line is passed over the sheave, a mechanical advantage is gained. By using ^{Two blocks with 4 sheaves} ~~this machine~~ it is possible to gain a mechanical advantage which would allow you to lift 100 pounds with only a 25 pound effort. How? Let's look at a block and see.

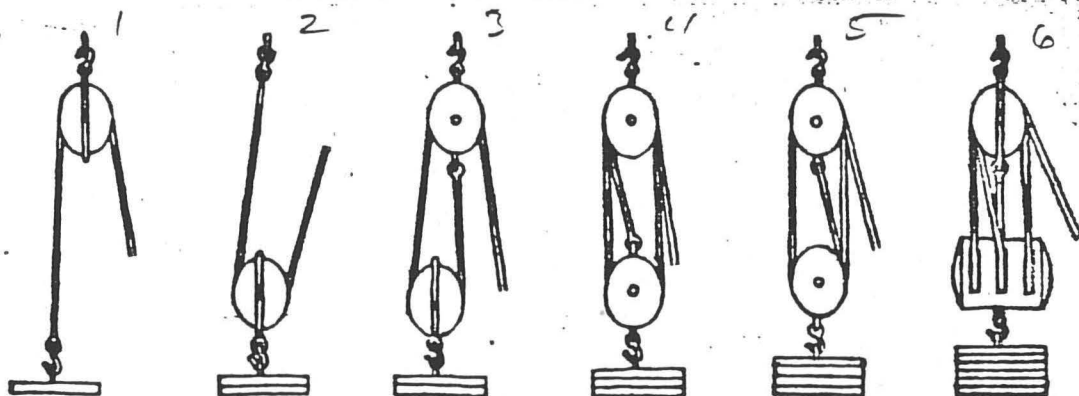


A block is made up of four parts: 1. the frame or outside (the sides ^{are} ~~are~~ called CHEEKS), 2. the SHEAVE (or pulley) over which the line passes, 3. the PIN (or axel) on which the sheave rides, and 4. the STRAP which provides the support for the pin, and a place to attach a hook or shackle at one end, and forms the BECKET at the other. The becket is the place where the line is attached when rigging a block and tackle (or PURCHASE).

The mechanical advantage a purchase give you depends on the combination of blocks used, and can be calculated by examining the number of sheaves in the system. The more times a line passes through a block, the greater the advantage. Thus if you are using a DOUBLE PURCHASE (# 5 below), with its' four sheives, you gain a four to one advantage and (in theory) can lift four times the weight. A TRIPPLE PURCHASE rig (# 6 below) will give you a six to one advantage because it contains six sheives.

Some common purchases are shown below.

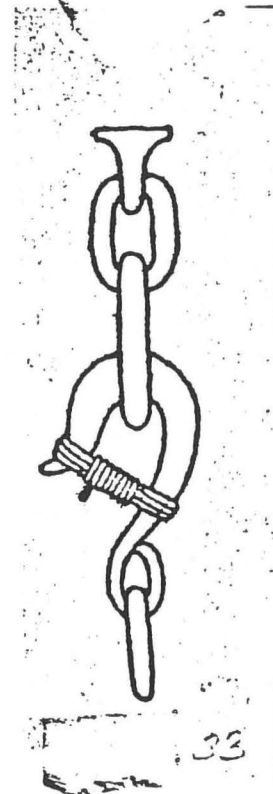
1. A RUNNER, a single block (one sheave), gives no mechanical advantage, but is a good rig for hoisting light weights.
2. Also a RUNNER, but since the block is free to move (compare it with #1), the effort is doubled.
3. A GUN TACKLE, has two single blocks (one sheave apeace) and therefore doubles the effort.
4. A LUFF, the upper block is a double (two sheaves), the lower, a single. The power is increased threefold.
5. A DOUBLE PURCHASE, consists of two double purchase blocks and has an advantage of a fourfold increase in effort.
6. A TRIPPLE PURCHASE, has three sheaves in each (tripple purchase) block, and gives a sixfold advantage.



Now examine some of the purchases rigged on ALMA. Which ones are designed to lift the greatest weights? Which to simply change the direction in which the line travels? Why is there a purchase rigged to the end of some of the halyards? What advantage is it?

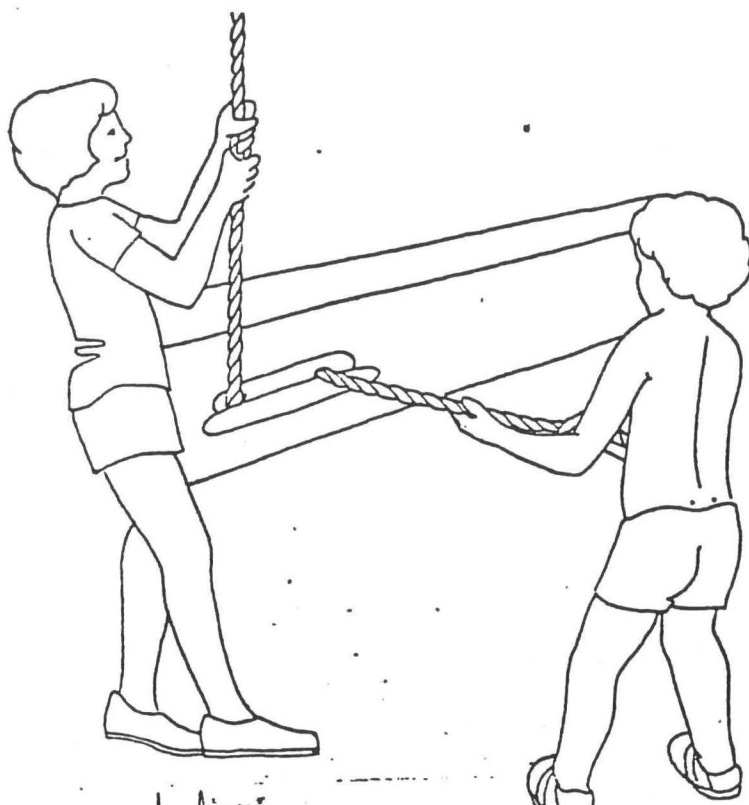
MOUSING

A hook is probably the easiest way to attach a block to an object. There ~~are two~~ ^{is one} problems with hooks which can creat a safety hazard: A hook, by its' nature, is open on one side. Should ~~it become~~ ^{THE LOAD} slack it could work loose and drop what it is holding. To prevent this a MOUSING is attached to all hooks used on ALMA. A mousing is simply a series of turns around the open part of the hook, followed by a series of turns around the first set (or FRAPPING TURNS). This latter step pulls the lashing tight, and makes it more difficult for the hook to slip. Mousings can be done in either twine or wire.

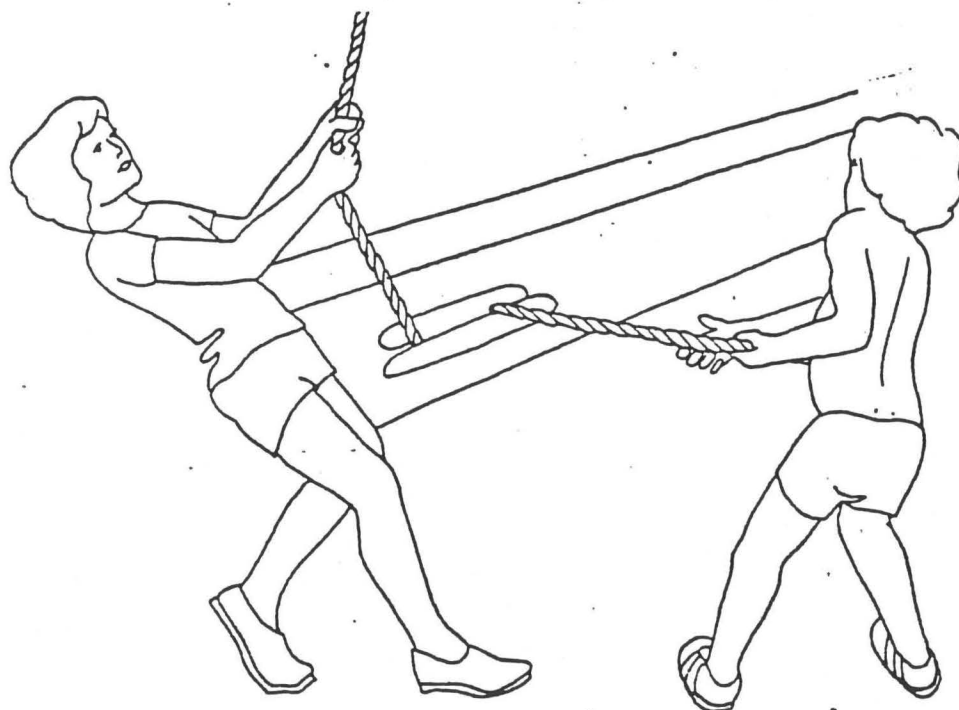


SWEATING A LINE

Even with the advantage of tackle many lines need tightening. Sometimes it takes an extra pull to ^{make the line tight or} "bring the line home". To accomplish



this we SWEAT ^{the line} ~~it~~. Basically sweating is pulling a line ~~out at an~~ ^{around a cleat or Belayin} pin and taking it up tight. Then pulling on the dead part of the dead side angle perpendicular to its lead, and feeding the slack into the ~~of the line more loose can be pulled around the cleat~~ cleat or belaying pin.



after running ^{the line around} From the cleat, the persons on the free end pull the slack around the cleat or pin. This action is known as TAILING, and is an important part of working a ship and her lines.

With a little practice you will find sweating and tailing an easy way to do all but the heaviest work. Care and teamwork are essential, for, should the line slip off of the cleat, all hands would be in danger.

— THE WINDLASS

This section
Should Be included
in anchor section

The machine which will help with the heaviest work on ALMA is the WINDLASS. It consists of a gear drive which turns four drums -- or GIPSY HEADS. Like everything else on ALMA's decks it is hand operated. You will find the handles mounted just forward of the windlass ~~mounted~~ just below the rail. Two PAULS are mounted just above the deck, and, when engaged will prevent the assembly from turning backwards.

DIAGRAM OF WINDLASS SHOWING
HANDLES, PAULS + DIRECTION OF TRAVEL
OF GIPSY HEADS, & PROPER TURNS W/ A HANSEN
ON ONE OF THEM.

When using the windlass note that the gipsy heads rotate in an opposite direction to the handles. ALWAYS MAKE SURE YOU KNOW WHICH WAY THE GIPSY HEADS ROTATE BEFORE ATTACHING A LINE.

To use the windlass, take three turns in a COUNTER-CLOCK-WISE direction. While one or more persons tail the line two people can turn the handles. TEAMWORK IS ESSENTIAL -- BE WARE OF WHAT EVERYONE ELSE IS DOING.

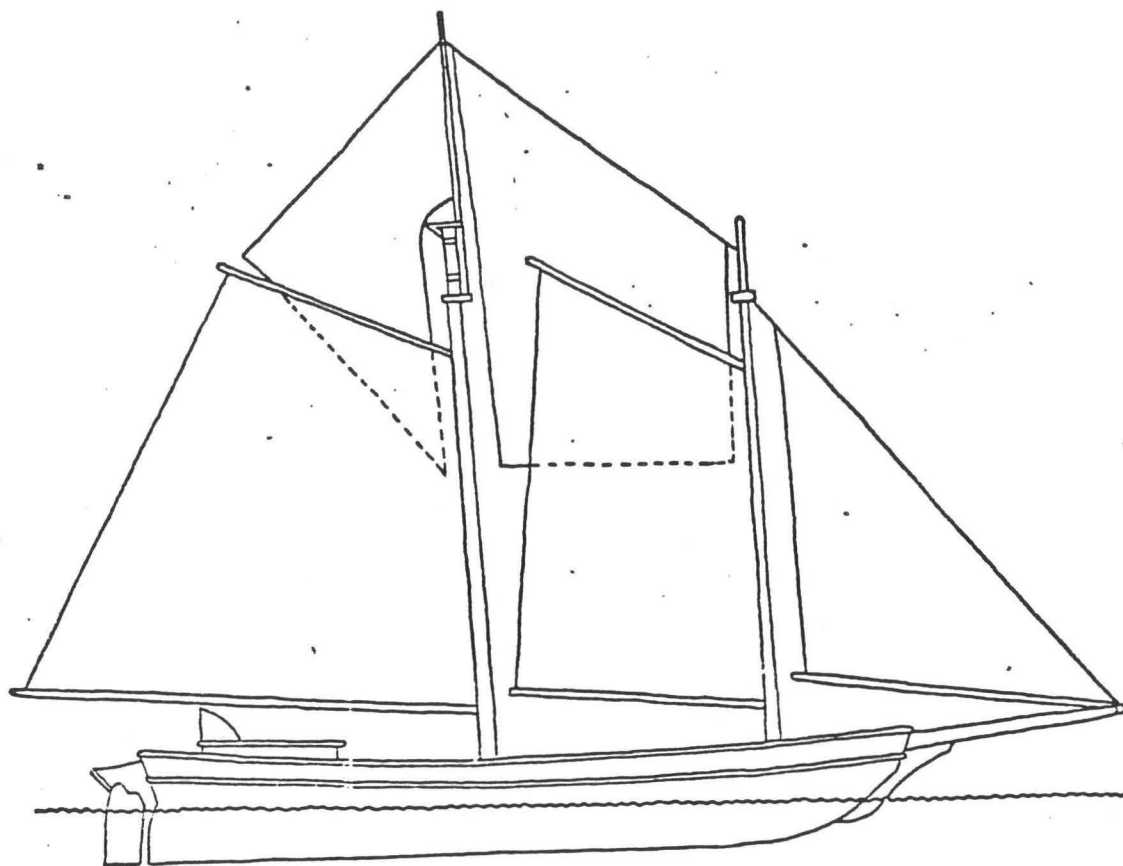
On scows like ALMA the windlass was not only used to operate lines on board, but was also used to help the crew with the loading and unloading of cargo, hoisting anchor, and WARPING SHIP. This latter process was used when winds were not favorable, and the ship had to be moved (ALMA carried no engine for the first years of her life). a small, KEDGE anchor would be lowered into a boat and rowed out to the full SCOPE (or length) of the line. It was then dropped, and the ship winched forward. One of the main anchors would then be dropped, and the process repeated until the ship was clear of danger, or had favorable winds again.

WOOD CUT / LONG DRAWING

KEDGING A SCOW

66-11-10-1000
ALMA

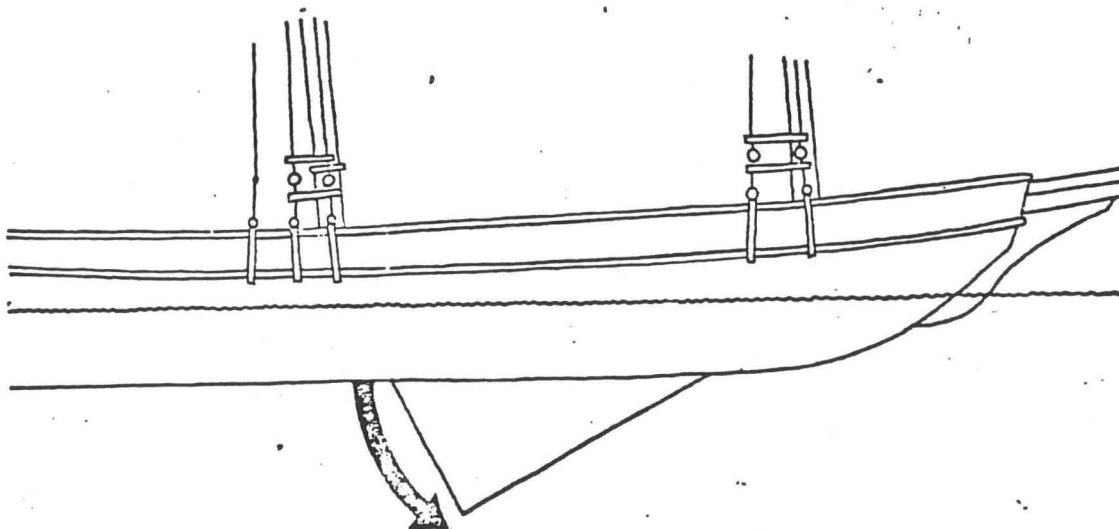
ALMA is a gaff rigged scow schooner. Each of these nouns describes something special about ALMA. In the next few pages we will take a look at what each of them means, what it takes to operate her, and how it all fits together.



Scow schooners are unique to the San Francisco Bay. At one time there was hundreds of these sturdy cargo-carrying vessels working the Bay hauling bulk farm produce from the river valleys to the City. The term SCOW refers to the way the hull is constructed -- and a very unique way it is! Scows were called upon to work the shallows of the Bay and rivers, so they were built with a flat bottom. This allowed the owner to pull in to a port (and in those days the "port" was often a low spot in the levy) at high tide, and as the tide went out, let his ship sit on the bottom while the cargo was being loaded.

Her flat bottom also gave ALMA (and all scows for that matter) a tremendous carrying capacity. If you look below decks you can see how heavy her wood construction really is. With most of the cargo carried on deck her massive deck beams had to support most of the weight. The rest of her timbers are equally as hefty.

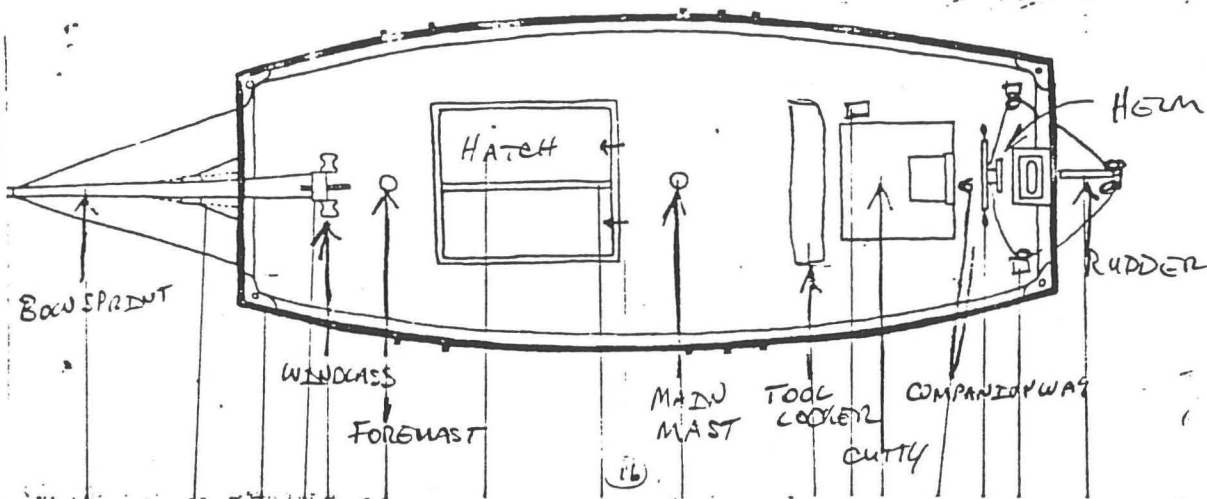
The scows flat bottom presented another problem which had to be corrected. When empty, these ships sit almost on top of the water. Their shallow DRAFT (draft is a measure of how much of the ship is below the water), allowed them to go places other cargo-carriers could not; however, it also allowed the wind to blow them side-ways. To compensate for this side-ways push the designers installed a large plank which could be lowered through the bottom. The CENTERBOARD



on ALMA can not be seen in a down position, but if you were to look at the divider between the holds you would find that this is the housing for the centerboard (or CENTER BOARD TRUNK), and that the top edge of the centerboard can be seen.

On Deck

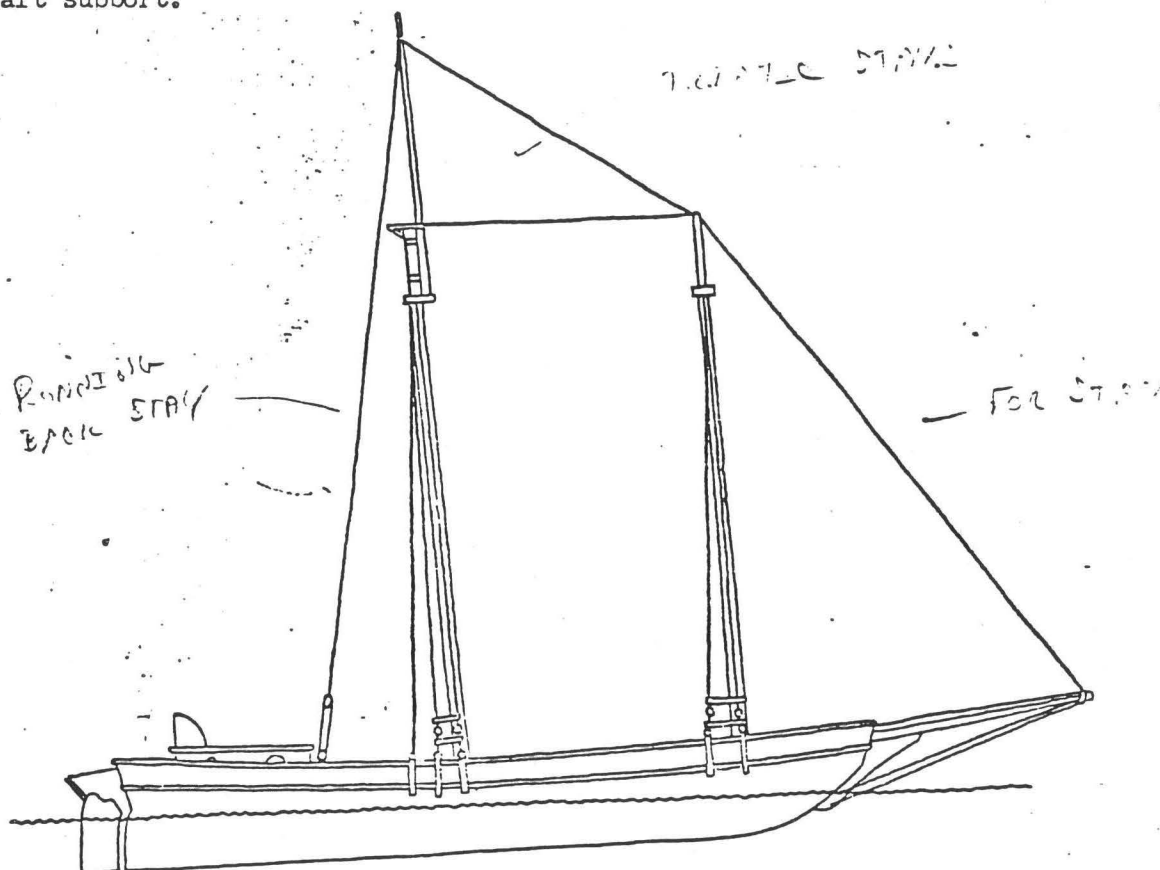
If you were to look down on deck from an airplane, you could see how the builders arranged the deck.



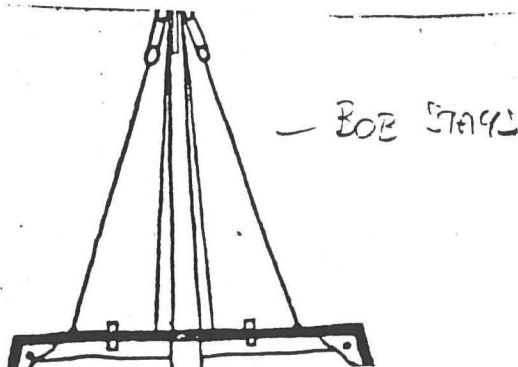
At one end is the BOW SPRINT, the spar which extends beyond the bow, provides a place to rig support for the masts, and allows enough room to hang a sail. As your eye travels aft (toward the stern) you will first encounter the WINDLASS, then the forward mast, or FOREMAST. Just abaft (or behind) the foremast is the hold, with its' entrance -- the HATCH, the boards which cover it (THE HATCH COVER) (the canvas which goes over the works is also referred to as the hatch cover). Just abaft (remember we are traveling toward the stern) the hatch is the tallest mast on board -- the MAIN MAST, and above it -- the TOP MAST. The TOOL LOCKER rests on the deck just before the DECK HOUSE which houses the CUTTY. This small cabin provided the only shelter for the men who used to work these vessels. If we were to stand next to the COMPANIONWAY (the entrance to the cutty) we would be next to the wheel or HELM, and its steering gear. The helm is connected to the RUDDER by a series of blocks and lines. This type of rig was used to steer the scows, because it allowed the helm, and its' helmsman, to be raised high enough to see over the deck load of cargo.

— STANDING RIGGING —

The rigging which plays the principal role in keeping the masts (and bowsprit) upright (or standing) is the STANDING RIGGING. The standing rigging is broken into two types based on the job they do: The SHROUDS provide a side to side support; while the STAYS provide a fore and aft support.



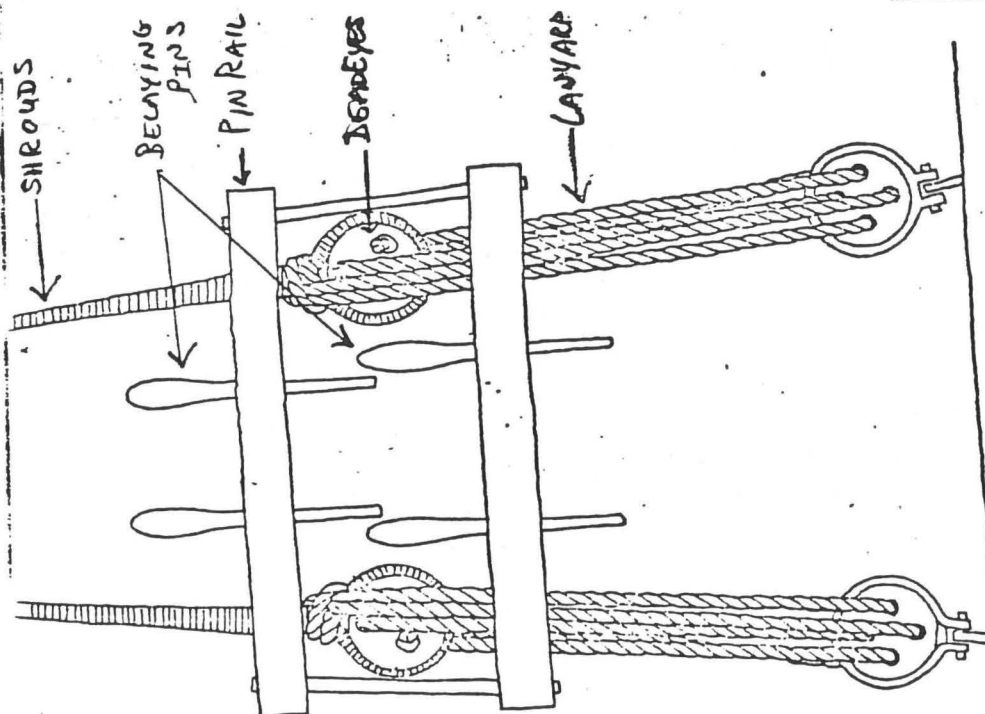
Even the name for one of the sails is derived from the fact its principal support is one of the stays: the FORE STAYSAIL



All of the stays are set when the ship was rigged -- with two exceptions -- The RUNNING BACK STAYS. These back stays are designed so that they can be tightened or loosened as conditions change.

DRAWING - ONE OF THE RUNNING BACK STAYS - LABELS WHERE IT LOADS TO & FROM.

The SHROUDS, perhaps more than any other part of ALMA show she is from a bygone era, for they are set-up with DEAD EYES AND LANYARDS.



REDUCE TO FIT PAGE

Deadeyes are the earliest known blocks to be used by Man, and have
been replaced ^{modern} intrigging by turnbuckles. ALMA's shrouds also provide
support for the PIN RAILS, where much of the RUNNING RIGGING (rig-
ging used to work the sails) is belayed. Above the dead eyes and
lanyards the stays are made of wire rope, some of which has been
protected by worming and parceling. A coat of tar helps protect
the metal from rust (as does a modern process known as galvanizing,
or coating the entire cable with a metal which is resistant to rust).

- THE SAILS -

ILLUSTRATION - OVERALL

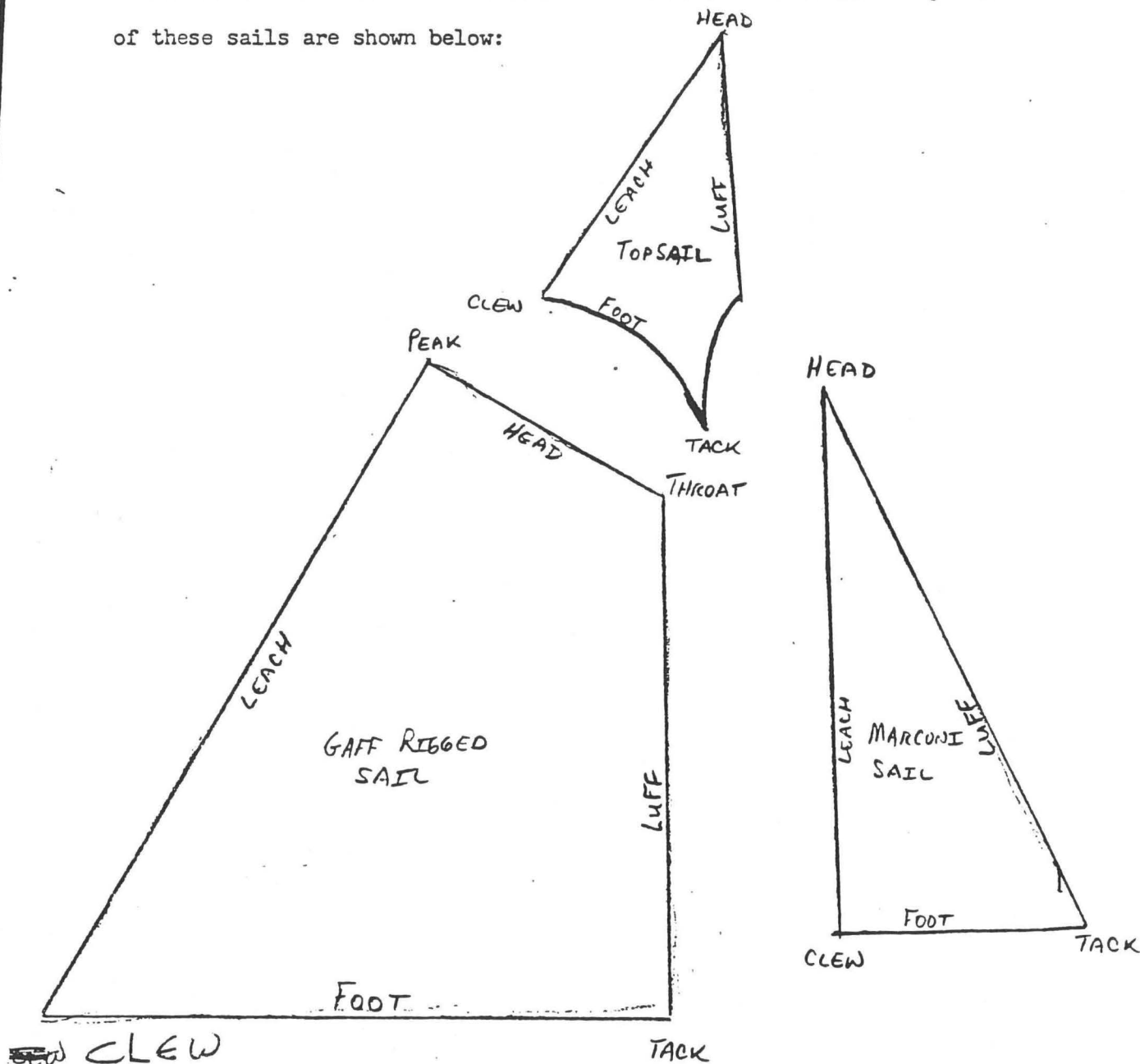
PICTURE, PORT VIEW, FISHERMAN

SET TO STARBOARD.

- DONE SET PAGE 44

PARTS OF A SAIL

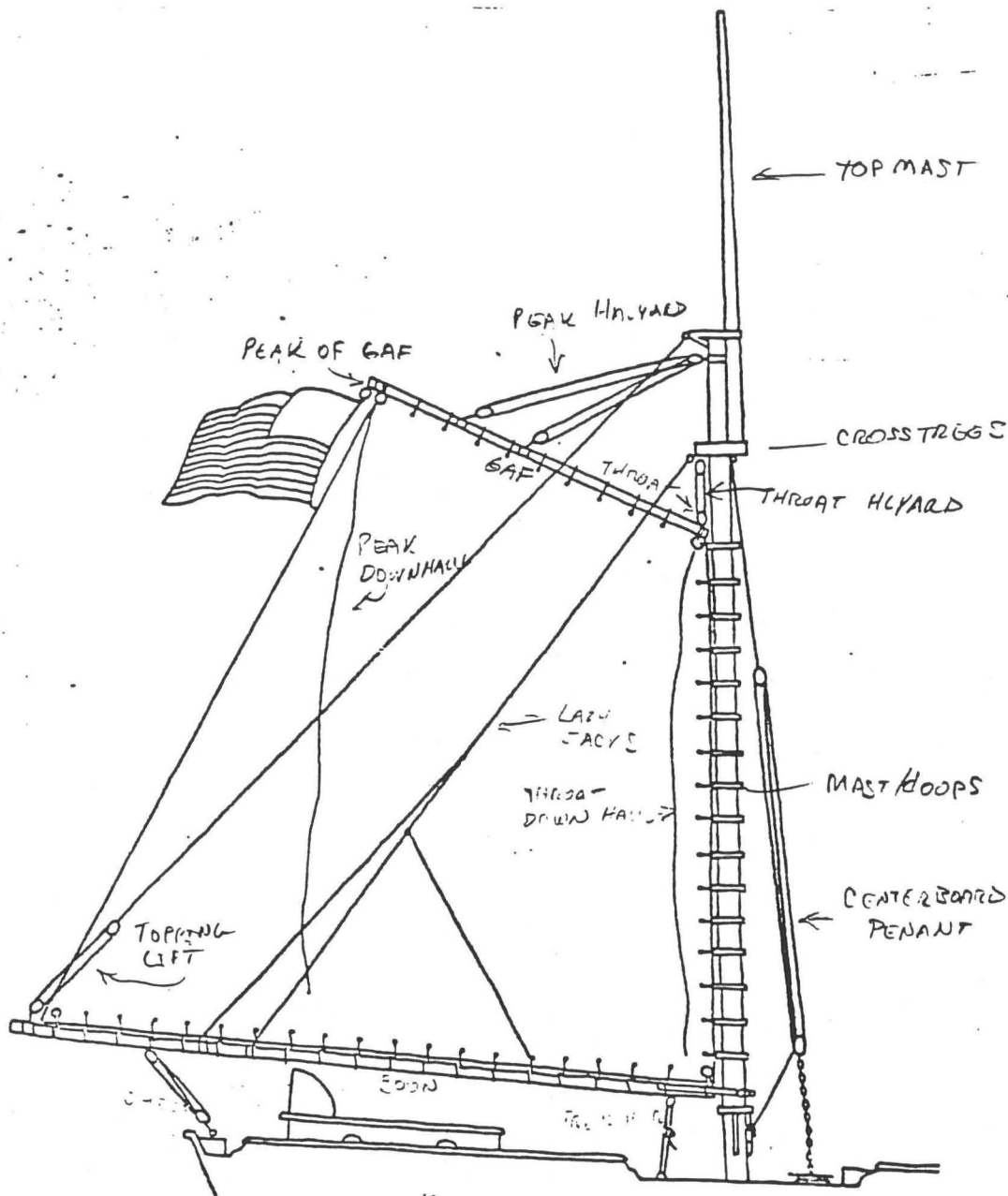
To understand ALMA's gaff rig it will be helpful to look at a couple of sails. The one ^{IN LOWER RIGHT} to the left is the type seen on most modern sail boats, and bears the name of its designer -- MARCONI. The other main-type of sail carries a spar ^(OR WOOD POLE) along the top edge of the sail, and derives its name from it -- GAFF RIGGED SAIL. The names for the parts of these sails are shown below:



Now lets look at each of the sails ALMA carries.

THE MAIN SAIL

The MAIN SAIL is the after most sail ALMA carries. It is also the largest of her five sails, and provides the ^{a large percentage of the} real driving force.



The Main Sail ^{is with all other sails} is controlled by RUNNING RIGGING. As we go through the next four sails you will find that they are very similar to the Main. Same will hold true for many of the lines which controll them. Usually the name of the line (if it does the same function) will be the same from one to the other. For example the SHEET is a line which controll the movement of the boom, be it the FORE-SHEET, MAIN SHEET, or STAYSAIL SHEET.

Sheet from next Page w/ drawing +
With that, we will look closely at the running rigging for the Main Sail, and point out differences as we examine the others.

End of subject

HALYARDS

Every sail is raised with a halyard (as are flags). On a gaff-rigged sail like the Main, there are two halyards -- one for the PEAK, and one for the THROAT. For the Main these would be refered to as MAIN PEAK HALYARD, and MAIN THROAT HALYARD.

Drawing of halyard from working section

PURCHASES

Which do you think would weigh more -- a gaff rigged sail or a Marconi? For a given height, compare the amount of canvas a sail with a gaff can carry to the Marconi. This canvas, when added to the weight of the gaff is enough to require the use of an additional purchase on the halyard to properly tune (adjust) the sail.

Drawing of Jig purchase

For the Main these would be refered to as the MAIN THROAT (JIG) PURCHASE and the MAIN PEAK (JIG) PURCHASE.

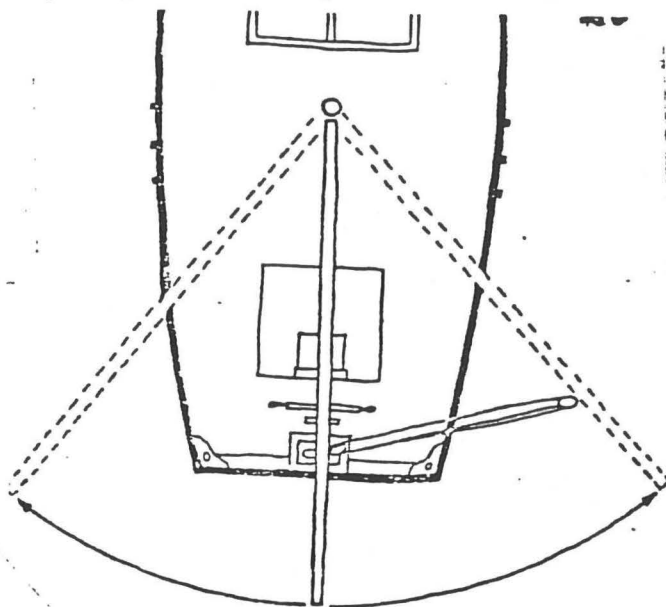
TOPPING LIFT

A topping lift runs from a point high on the mast to the tip of every boom. It is this line that enables the crew to free the boom from the BOOM CRUTCH (the cradle in which the boom rests when not supported by the sail). On the Main it is the MAIN TOPPING LIFT.

Drawing of Kuntel & toping lift (working section)

SHEETS

The angle of the sail (to the wind) is controlled by a sheet. The Main is controlled by the MAIN SHEET, and can either be SHEETED IN (toward the center line of the ship) or SHEETED OUT (as ^{would be done} with the wind directly at your back if you were facing the bow).



DOWNHAUL (or bull rope)

In the event a sail becomes jammed, this is a good line to have! A downhaul attaches to a point on the sail near the halyard, and extends to the deck. On a gaff sail like the ALMAS' Main the THROAT DOWNHAUL serves this exact purpose -- to pull the sail down if it fouls. The MAIN PEAK DOWNHAUL (which is sometimes referred to as a BULL ROPE) serves an additional purpose, for with it, the crew can control the movement of the gaff while the sail is raised or lowered.

CAT STOP

On the Main (and Fore) booms near the throat (mast end) a line runs through a hoop on the boom to a ring in the deck. It is the MAIN CAT STOP which prevents the boom from being raised as the sail is stretched to its full height. For this reason the cat stop has also been referred to as the boom downhaul.

Downhaul needed

*Drawing for -
working, action*

LAZY JACKS

not on main sail - ?

These lines run from a cleat at the base of the mast, through a block near the top of the mast, to a point near the middle of the boom. There are two sets on the Main boom (same with the Fore and Stay) -- one on the port side, one on the starboard. These lines guide the canvas in toward the boom as the sails are lowered, thus simplifying furling (neatly folding) of the sail.

Drawing

PREVENTERS

On ALMA we use preventers on the Main and Fore booms. A preventer is a block and tackle which runs from the boom to a ring on the deck near the rail. Their purpose is to keep the boom from accidentally swinging across the deck, possibly causing injury.

Drawing made

THE TOP SAIL

Near the top of the main mast, a smaller, shorter mast is attached.

It is this TOP MAST which allows the ALMA to ^{use a} ~~call herself~~ a TOP-SAIL, *this making her a*
SCHOONER. *Top sail schooner*

ILLUSTRATION SHOWING
TOP SAIL - LINES CAPLED

The top sail is the only sail on board which does not have a sheet. The corner which would normally be sheeted^(THE CLEW) is attached to the main gaff, and is tuned automatically as the main sheet is adjusted

The different lines which controll the top sail are named after the part of the sail to which they attach; thus we have:

The TACK LINE controll the bottom corner, and is belayed at the base of the main mast.

The CLEW LINE is where the sheet should be, and instead of running to the deck, it passes through a block at the peak of the main gaff, to a belaying pin in the jaws of the main boom.

The TOP SAIL FURLING LINE was rigged to allow the sail to be stowed from the deck. If worked properly the sail will form a bag around itself as the furling line is taken in thus freeing the crew from going aloft to stow the sail.

THE FORE SAIL

The second largest sail ALMA carries is the fore sail. It like the main carries a gaff at the head of the sail, and carries the same type of rig. Compare the names of the lines on the fore with those of the main.

ILLUSTRATION :

FORE SAIL, LINES &
PARTS LABELED

THE STAY SAIL

The forward most sail ALMA carries is named after the stay on which it rides: the FORE STAY. Although ^{IT} ~~this~~ is the only ^{head} ~~harconi~~ sail ALMA carries, ^{and it is} ~~it is one of the most critical sails~~ ^{for} in maneuvering, ^{to} ~~for it is this piece of canvas which can either swing her bow across the wind (when tacking) or prevent it.~~ The STAY SAIL ^{boom} ~~BOOM~~ can be ^{used to control the foot of the sail (as illustrated) or left} ~~used to control the foot of the sail (as illustrated) or left~~ ^{resting in its} ~~resting in its~~ crutch. When the latter is the case the staysail lashings (the line which holds the bottom edge of the sail to the boom) are cast free and the sail is said to be LOOSE FOOTED.

The working Rigging is similar to the main sail but it only has one halyard.

When not in use the fisherman is

The only sail on ALMA which is not left rigged when not in use is

the FISHERMAN sail. ~~This piece of canvas~~ *is stowed below decks,*
but ~~when flown helps to fill~~ *in use it fills* the gap between the fore sail and the
main. The two halyards are simply lines which pass through a

single block at the top of each mast. The fisherman can be bent

to either end of these lines, for she must be set on the leeward side

(the side away from the wind) ~~to be flown properly.~~

The two FISHERMAN SHEETS are bent permanently to the bottom corners of the sail and

stowed with it. ~~Below you can see the fisherman set, filling the~~

~~gap between the main and the fore.~~ *the fisherman must be ~~lowered~~ and*

lowered raised again each time Alma tacks. ~~It changes~~
its direction in relation to the wind.

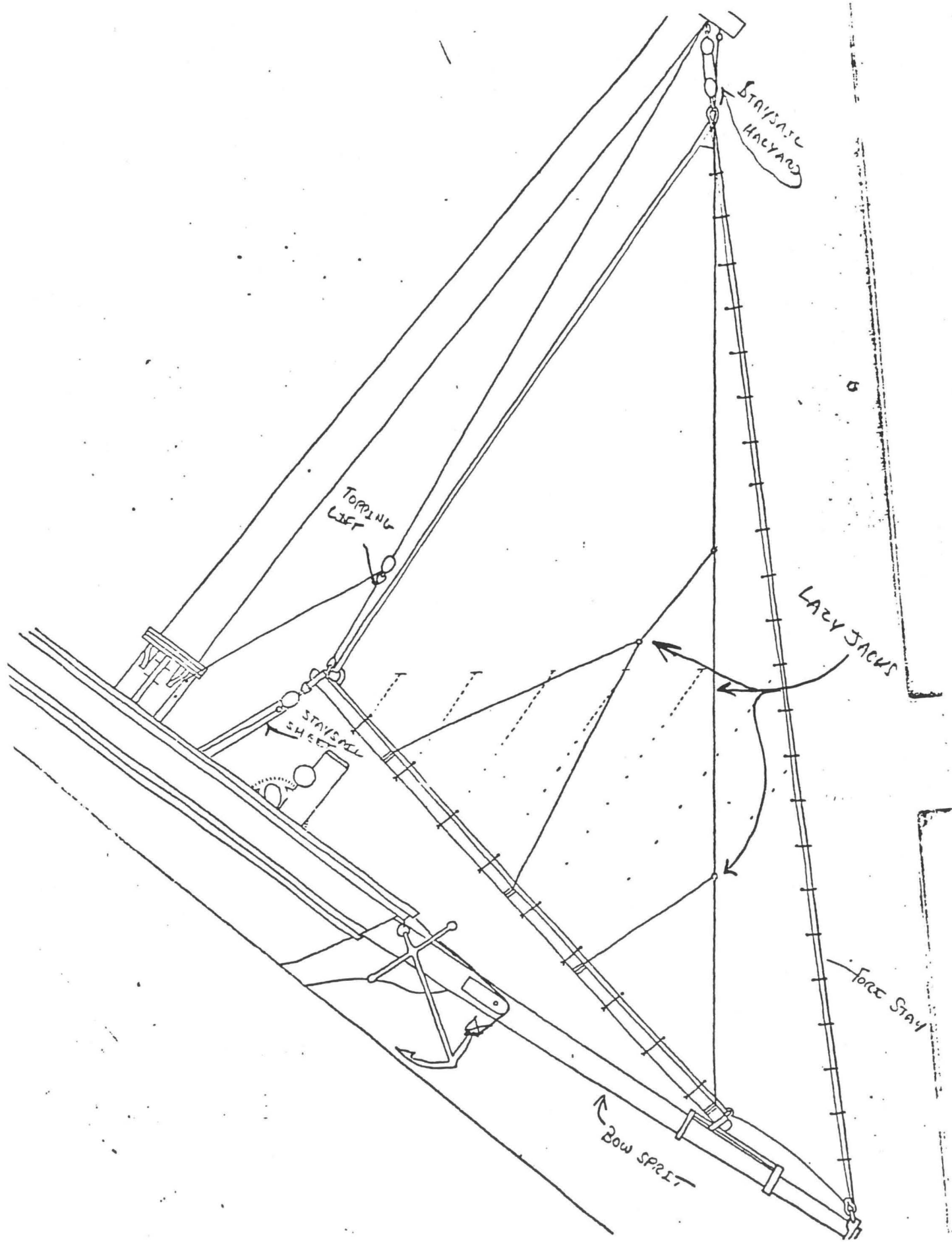
ALMA FORT TACK -

ALL SAILS SHOWN -

FISHERMAN HIGHLIGHTED BY

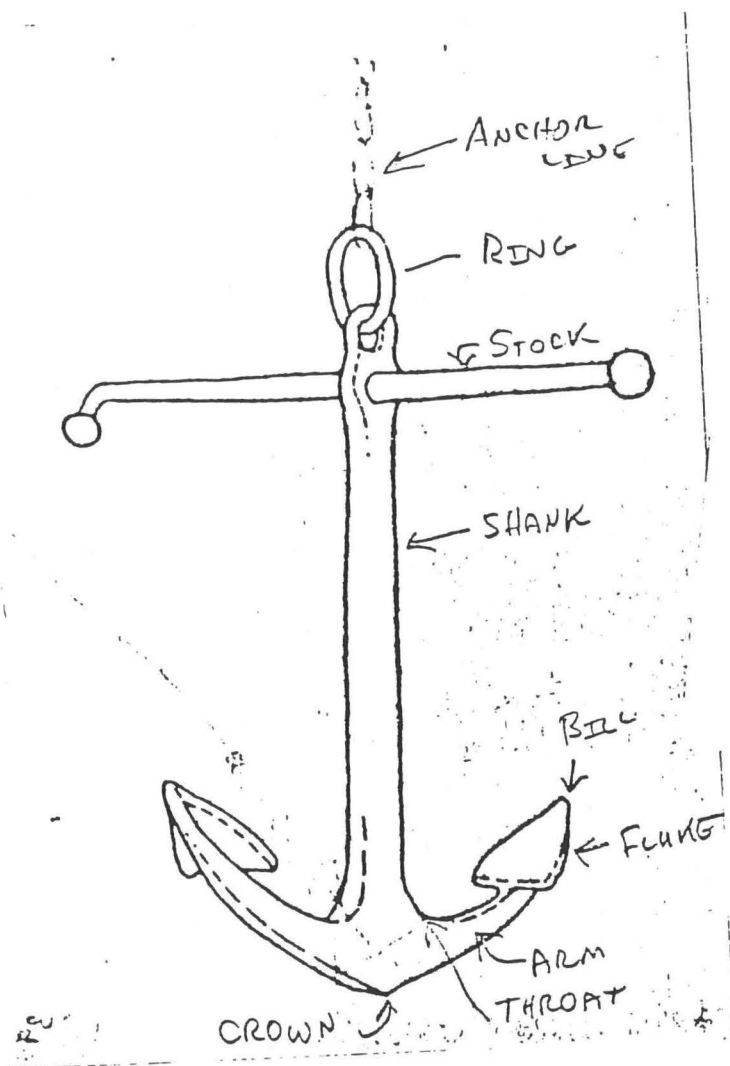
LINE LABEL.

- DONE - ORIGINAL IN
A. DRAKE OFFICE



THE ANCHOR

The iron hooks which can be used as temporary mooring are referred to as ANCHORS (or ground tackle). The type of anchors ALAA carries are BOWEN anchors and consist of eight parts:

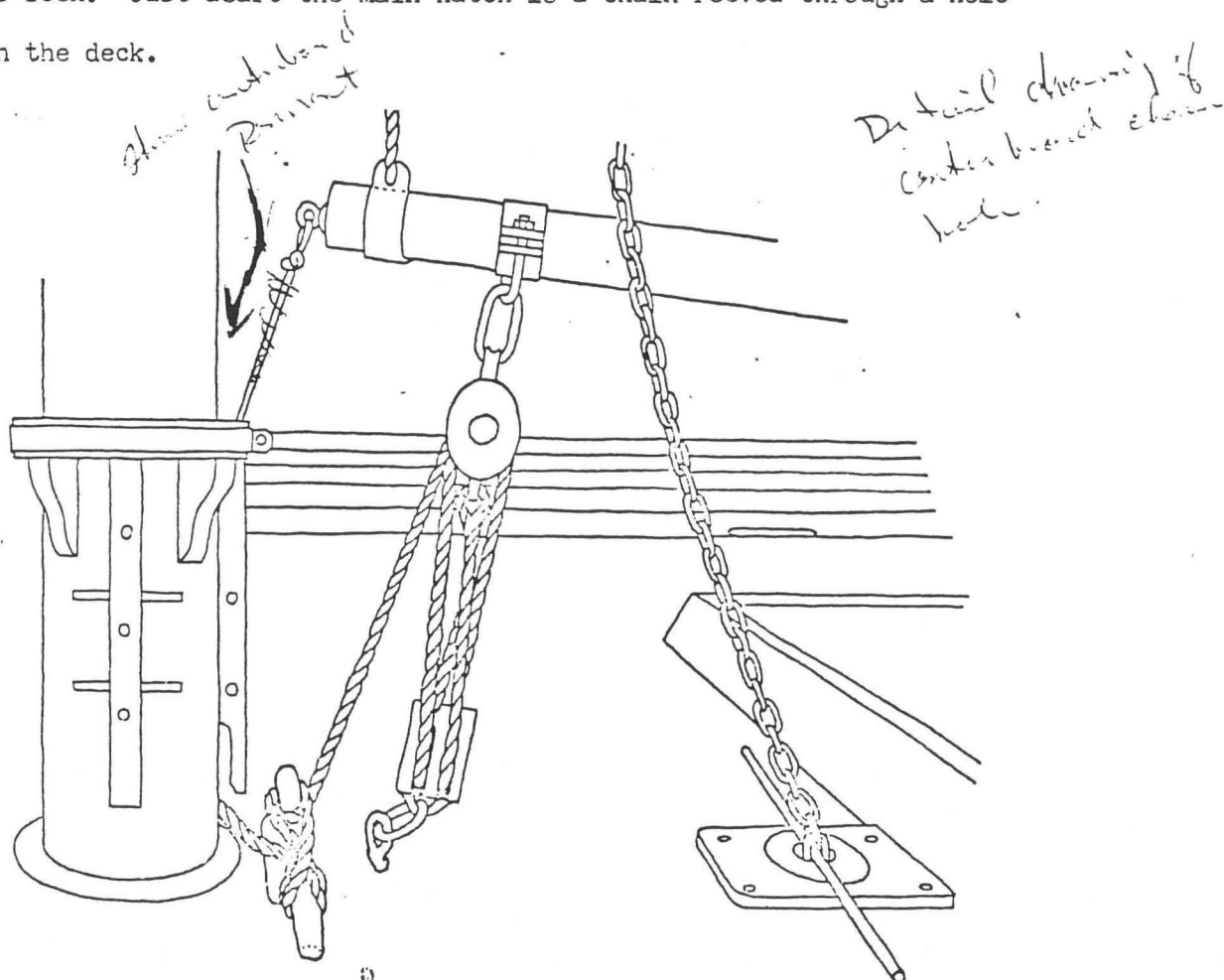


Move To Anchoring Section

In addition to the ANCHOR LINE (or cable) the anchors are also controlled by ANCHOR TRIP LINES which are bent to the FLUKE at the ARM. It is this line which allows the anchor to be lowered slowly, and can be helpful when freeing the anchor from the bottom.

THE CENTERBOARD

Like all scows, 'ALMAS' flat bottom has a tendency to slide sideways in the water as she sails. To help prevent this the designers placed a board in the center of the ship which can be lowered to provide more controll while sailing. The CENTERBOARD TRUNK (the box which houses the centerboard) can be seen in ALIAS hold. It is, in fact the divider between the port and starboard sides of the main hatch. Just inside the trunk, the top edge of the centerboard can be seen. Just abaft the main hatch is a chain reeved through a hole in the deck.

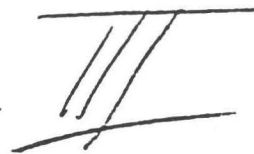


This is attached to the after end of the centerboard, and it is with this chain that we can raise and lower the centerboard. Either a steel pin, or a crescent wrench with a pointed handle (a SPUD WRENCH) (D)

can be used to controll how far down the centerboard is lowered.

- A purchase has been rigged to the main mast to raise and lower this
- chain. it is called the CENTERBOARD PENNANT, is belayed to the bottom pin of the MAIN MAST CLEAT PINS (forward side of the mast), and when not in use is attached to the mast. When needed, it is unbent, the hook in the lower block is attached to the large ring in the centerboard chain, the strain taken by the purchase and the centerboard is lowered to the desired level. The steel pin or spud wrench is inserted at this point and the purchase returned to the mast.

CHAPTER



~~CREW STATIONS~~

~~AND~~

~~RESPONSIBILITIES~~

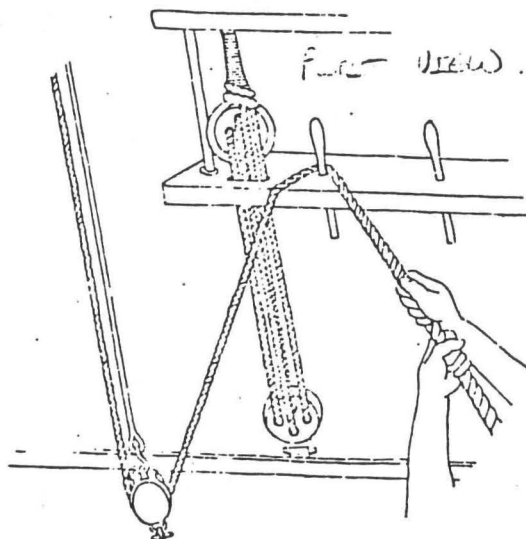
Working ALMA

Raising Sail

This crew is also referred to by the sail which occupies most of their attention -- the main sail -- and are often referred to as THE MAIN SAIL CREW. They are responsible for the mainsail, topsail, flag halyards, fisherman sheet, running backstays, and after mooring lines.

RAISING THE MAIN SAIL

1. Check the position of the halyard jig purchases. They should always be set so that the top block is two-thirds of the way up the mast, and clear to run with no twists or tangles in the system. The purchases (remember there are two) are belayed to the after pin of the lower pin rail of the main shrouds. Don't forget to check both port and starboard's purchase.

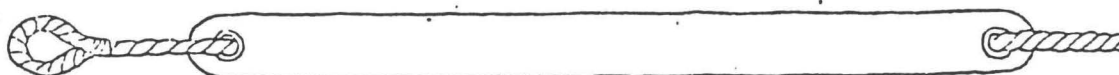


ADJUSTING THE PEAK PURCHASE

2. Rig the mainsail preventer. It is stored in the deck locker, is a double purchase tackle, and is made ready as illustrated.

ILLUSTRATION SHOWING FORWARD SECTION OF
MAIN BOOM (INCLUDING JAW & MAST) WITH STRAP IN
PLACE AND PREVENTER MADE UP

3. Remove the gaskets and store them in the deck locker. A GASKET is a canvas strap with short pieces of line attached which is used to secure the sail after furling.

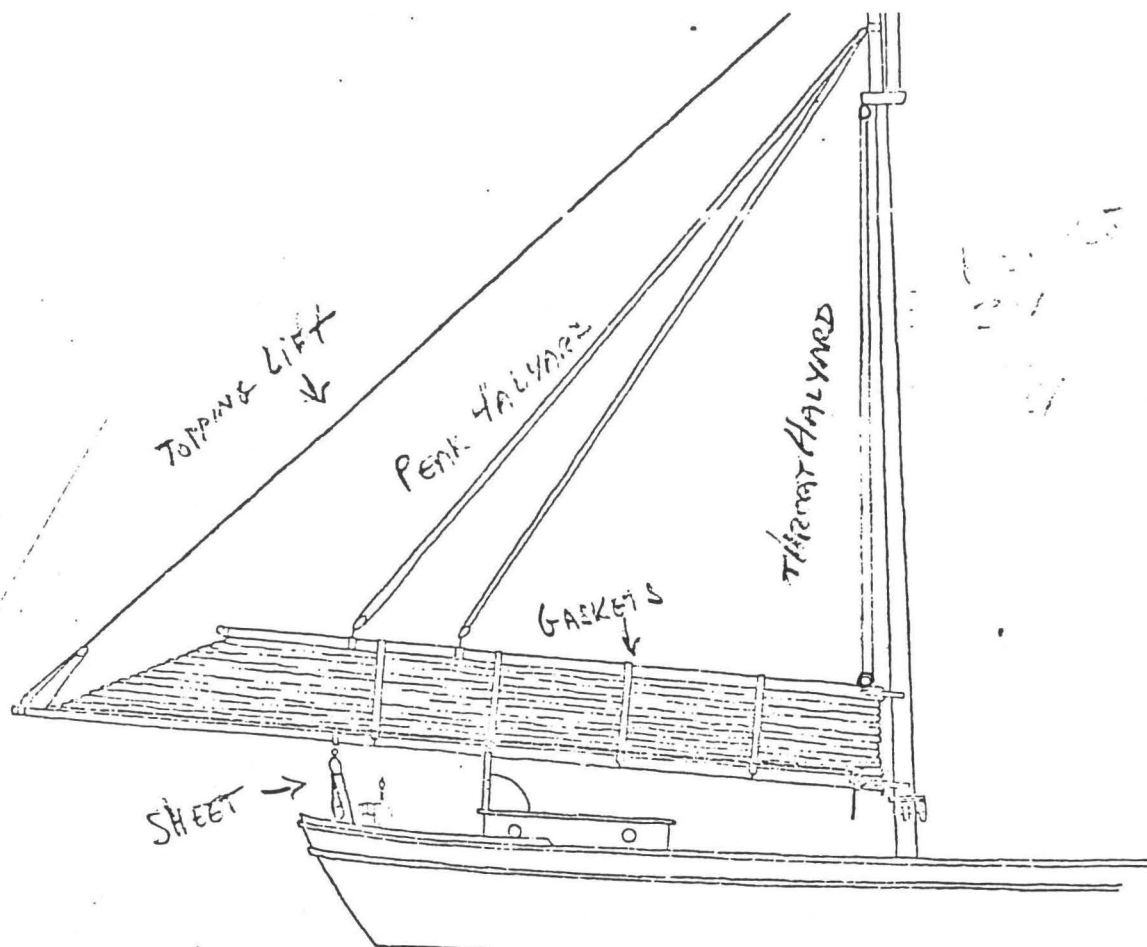


A GASKET

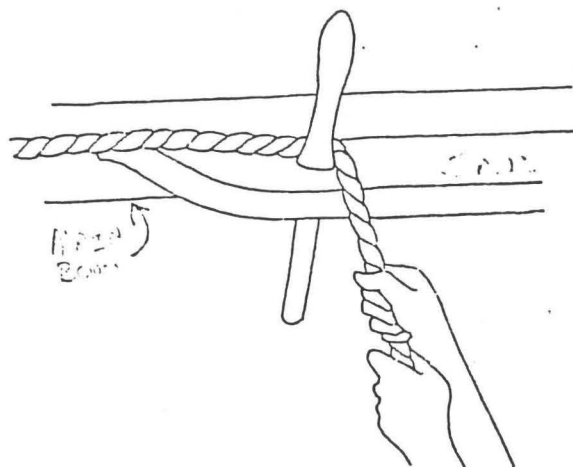
4. Slack the topsail clew line. This line is found on the port side of the jaws of the main boom, belayed to a pin. Slack this line completely letting it hang loose.
5. Slack the main sail sheet. Leave several feet of slack, and secure it loosely with a couple of turns.

ILLUSTRATION

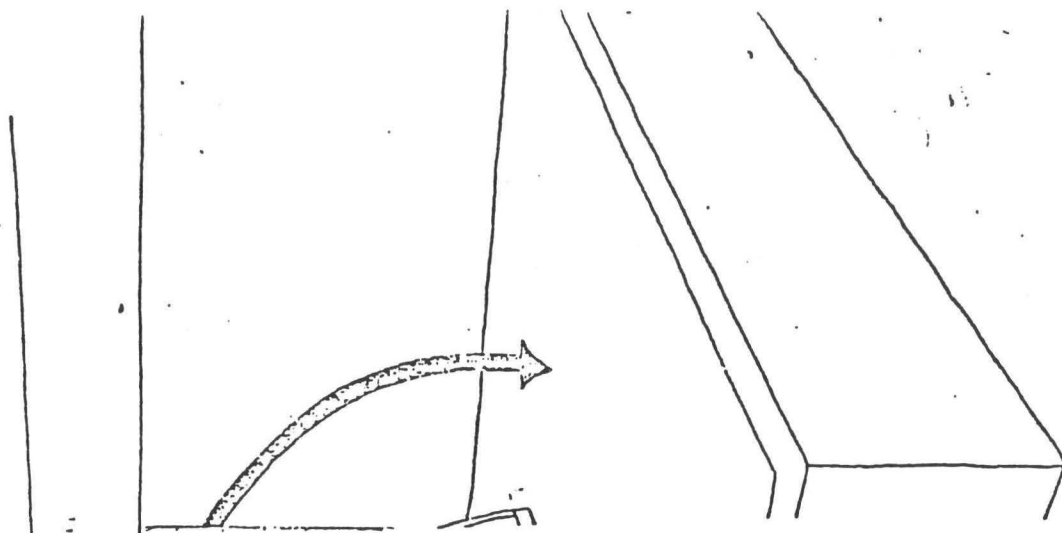
MAINSAIL SHEET
(OPEN!)



6. Take up on the topping lift. This line is belayed to a pin on the starboard side of the main boom jaws, and at this point carries a lot of weight. Several crew members will be needed for this task.

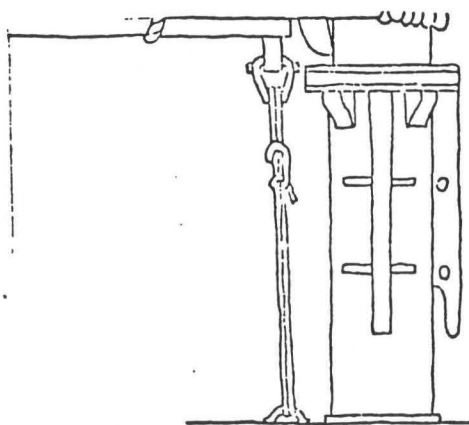


Hauling on the main
topping lift



RESTRICTED
LEADING CRUTCH
RANGE 50%

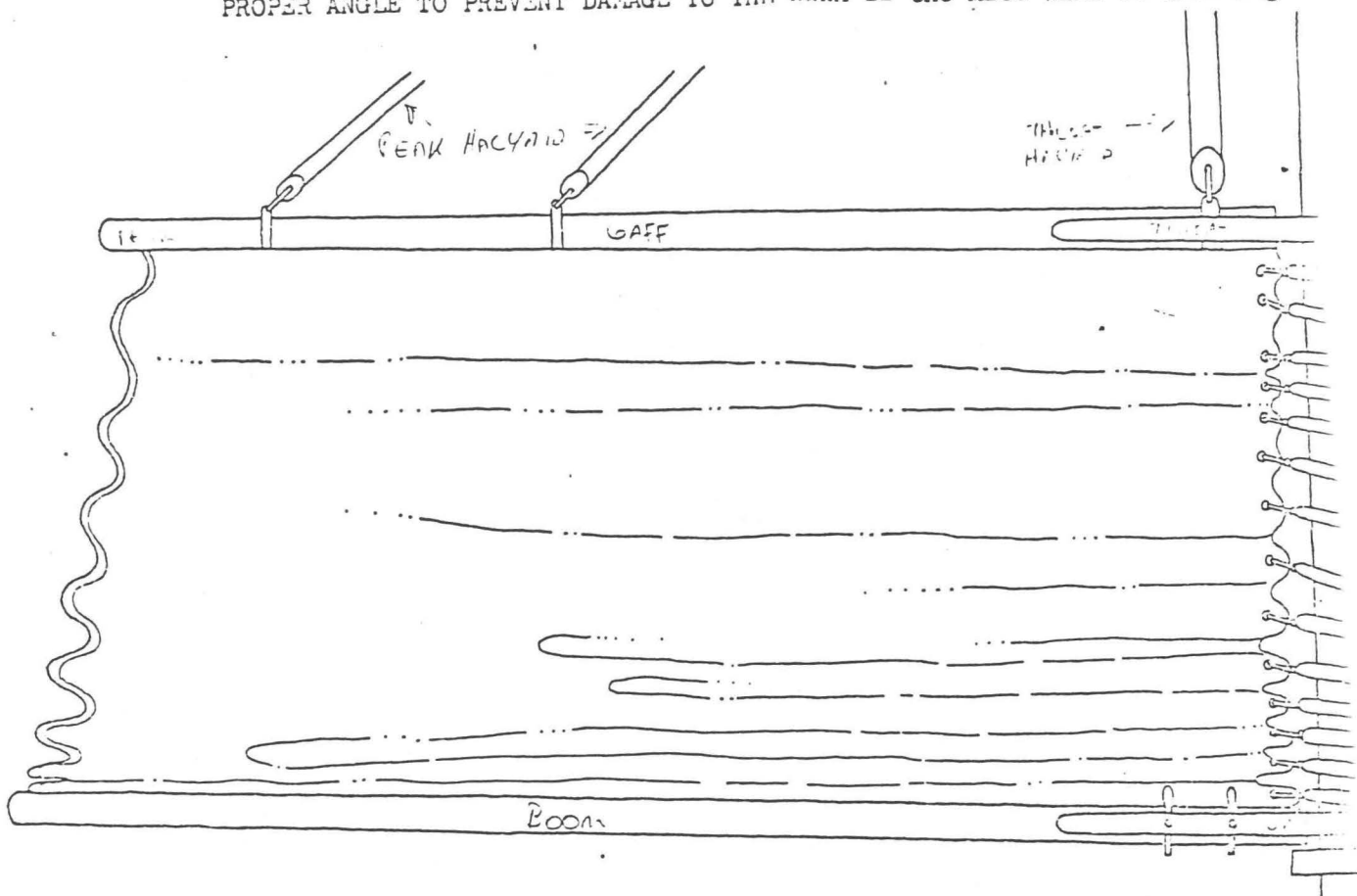
8. Free the peak and throat downhauls. One crew member should be assigned to the peak downhaul (bull rope), and should tend this line from the port side while the sail is being raised.
9. Set the cat stops. This line restricts how high the jaws of the boom can be raised, and allows the sail to be stretched tight. Enough slack should be allowed so that the boom can be raised (by the sail) enough for comfortable head room.



CAT STOP RIGGED WITH
STOPPER KNOT

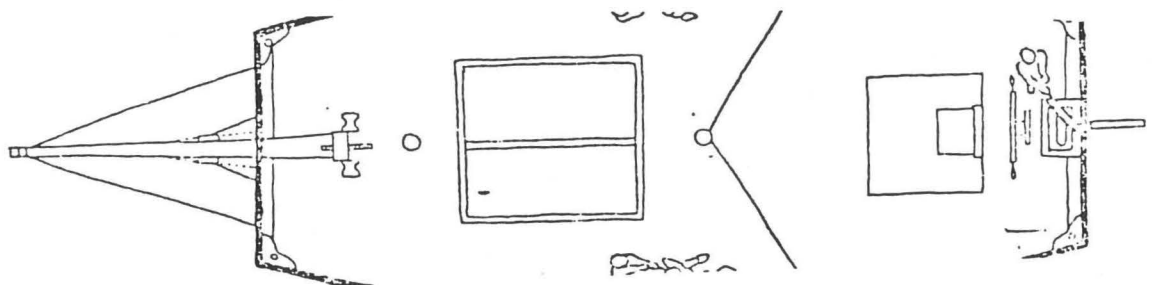
66

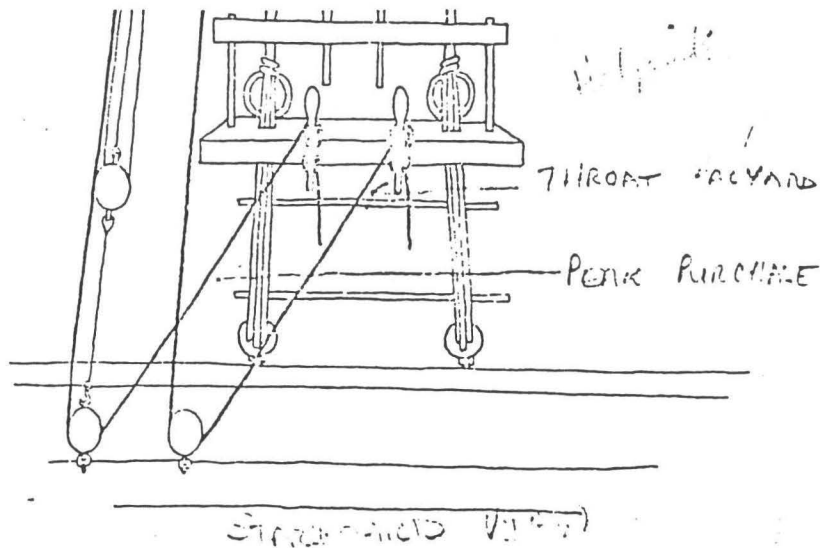
We are now ready to raise the main sail. One crew member will be assigned to the sheet, and one to each of the downhauls. The remainder of the crew will be divided between the two halyards. Listen carefully to the mate for directions -- THE GAFF MUST BE RAISED AT THE PROPER ANGLE TO PREVENT DAMAGE TO THE JAWS -- the mate will be watching



The peak should be raised even with or slightly higher than the throat

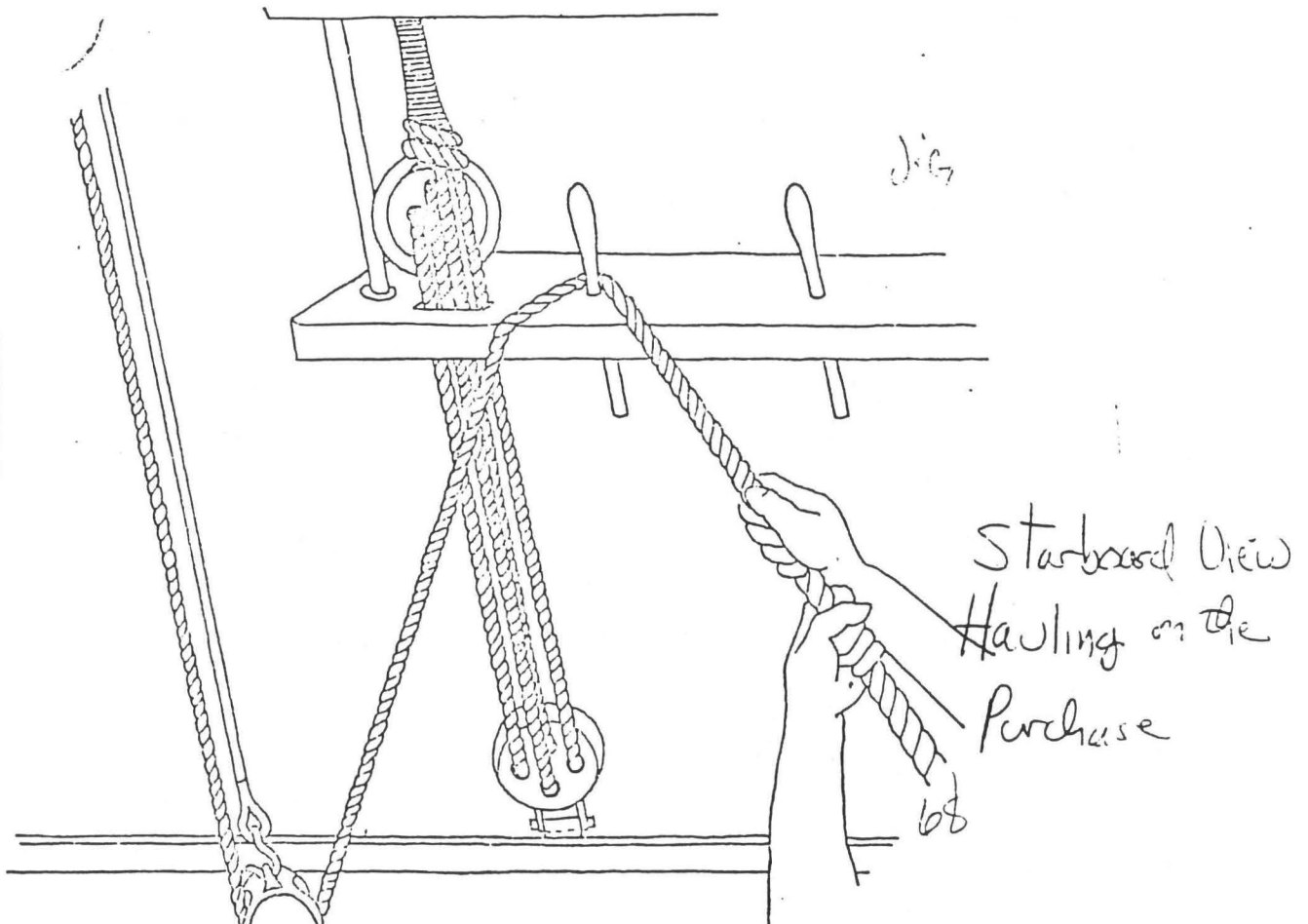
10. Hauling on the halyards. The peak halyard is found on the port side, and the throat on the starboard. Take hold of the line after it comes out of the deck block and pull together toward the after-end of the ship.





Remember which halyard you are on, be ware of what the rest of your crew is doing, and listen for the mates orders.

11. When the order is given, belay the halyards and man the purchases. Remember, the throat purchase is belayed next to the peak halyard and vica-versa. Again listen for the orders of the mate as he directs the final tuning (streaching) of the sail.



12. Now is the time to make things neat. Check the lazy jacks and topping lift for interference with the sail. If they are too tight they will make a dent in the curve of the sail. Slack them at the direction of the mate.

13. Clear working area. Coil all lines and hang them in their proper places. Make ready to set the top sail.

14. That portion of the crew working with the main sheet should set it at the direction of the mate as the remainder of the lines are made up, and then make the sheet up also. They too should report to the mate as he makes ready to set the top sail.

SETTING THE TOP SAIL

ILLUSTRATION — PORT VIEW — MAIN SAIL
SET. INCLUDE ENTIRE MAST & SHROUDS —
SHOW LEADS OF LINES.

TOP SAIL

1. Free the furling line from its' lead (after pin, top pin rail, PORT SIDE main shrouds). Lay the coil down carefully so that it does not foul as it pays out. One crew member should tend this line.

9. Raise the sail the rest of the way with the halyard, while taking up on the outhaul some more. Sweat the halyard home, and belay.
10. Slack the topping lift so that the full weight of the boom is carried on the sail.
12. Make up all lines, and clear working area of unnecessary equipment.
11. Secure down haul.

SETTING THE FISHERMAN

More than any other sail the FISHERMAN requires teamwork. The First (Main Sail) mate will be in charge of the operation on the fisherman, while the Second (fore sail) and Third (stay sail) mates oversee operations which take part on their section of the ship. Crew responsibilities for the fisherman are:

MAIN SAIL CREW: AFTER FISHERMAN SHEET (clew line)

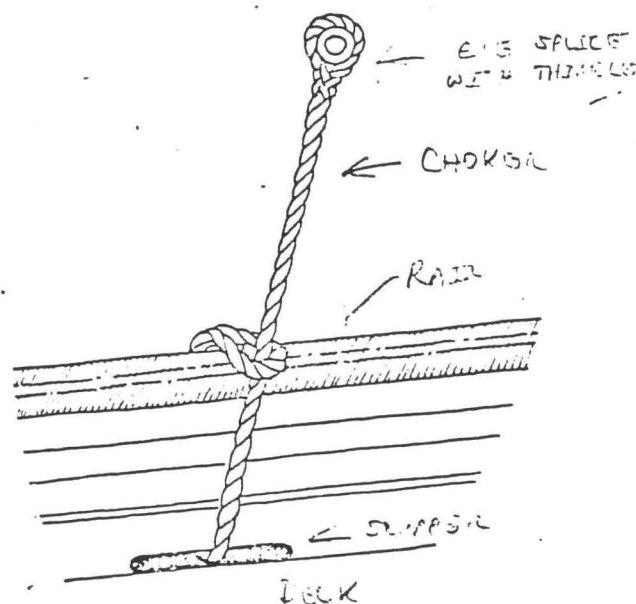
FORE SAIL CREW: THE HALYARDS (both peak and throat)

STAY SAIL CREW: THE FORWARD FISHERMAN SHEET (tack line)

ILLUSTRATION OF FISHERMAN SAIL
SET ON PORT TACK (STARBOARD WIND)
SHOWING LOAD OF LINES

Since the fisherman sail is free flying it has to be brought down and raised again on the opposite side every time the ship comes about. The procedure is that the sail is carried from one side of the deck to the other and is completely re-rigged each time. The set-up is basically the same for port and starboard tacks, so here we will look at the set-up for a port tack.

1. Because the fisherman is a free flying sail, her ^{sheet} tacle (blocks) have to be set each time the sail is prepared for raising. The blocks for the fisherman sheets are stored in the tool chest in the hold, and are attached to the ship by snap shackles to chockers. The chokers for the after sheet are passed through the scupper (slot like deck drains in the rail at deck level), and around the bow stay at the forward end.



CHOKER FOR AFTER FISHERMAN SHEET

2. The fisherman sail it self is stowed below decks in the port hold. The fore sail crew should bring the sail on deck and spread it out on the starboard side (for our port tack). The fisherman sheets are stored with the sail and can be taken by the ^{stay} fore and main crew as soon as the sail is all layed out.

REMEMBER THE FISHERMAN SAIL IS FREE FLYING -- HER SHEETS MUST BE PASSED OUTSIDE THE SHROUDS AND BACK STAYS BEFORE PASSING THROUGH THE SHEET BLOCKS.

3. The halyards for the fisherman are the only polyethelene lines used in ALMAS' running rigging. They are a simple rig for the line

2. Make ready the topsail halyard. It is located on the aft pin,
starboard side
top pin rail of the main shrouds. At the direction of the mate,
free the line and haul until it is two-blocked (a purchase is two-
blocked when it has been pulled as far as it can be -- the blocks
are actually touching). Two crew members are needed here.
3. With one crew member on each the clew line (belayed to the port
side of the main boom jaws) and the tack line (belayed to the base
of the mast) the sail can be set. Listen for orders from the mate
as to when and how much to haul on these (and all) lines.
4. When the order is given haul on both tack and clew at the same
time. When the sail is unfurled, then
5. Set the clew. It will take two crew members for this. When set, belay.
6. Set the tack., belay.
7. Furl all lines and stow properly.

RAISING THE FORE SAIL

Because the fore sail is also gaff rigged the procedures for it
are basically the same as for the main. The mate for the fore crew
will be giving directions for this process just as the mate for the
main does for his sail.

ILLUSTRATION - FORE SAIL SHOWING
LOCATION OF ALL RUNNING RIGGINGS:
SHEET, TACKING CLIT, PEAK & HEAD
HALYARD & PURCHASE

1. Check the position of the peak and throat downhauls. The downhauls are belayed to the after pin of the lower pin rails (peak starboard, throat, port). As in the main the lower block should be two-thirds of the way up the mast before the sail is raised.
2. Rig the fore sail preventer. It is stowed in the deck locker with the main preventer, but is some what smaller than the mains'. Make up the preventer to the boom so that it is ready to use when needed.

ILLUSTRATION OF BOOM STOPPER -
PREVENTER MADE UP - (COPY FROM
ALAN'S SECTION)

3. Remove the gaskets and store in the hold next to the centerboard trunk on the port side.
4. Free both peak and throat downhauls. One person should be assigned to man the peak downhaul (bull rope).
5. Set the cat stop so that there is some slack in the line. Tie the stopper knot so that the sail can be streatched as it is tuned.
6. Man the halyards. Again, the peak halyard is on the port side, the throat on the starboard. Free the coils from their resting places, and wait for further orders.
7. When the order is received, free the halyards, and as with the main man the lines after they come out of the deck blocks. Each team (port and starboard) should pull toge ther toward the after end of the deck. Listen for orders! The peak of the fore must be raised slightly higher than the throat to prevent damage to the jaws of the gaff.

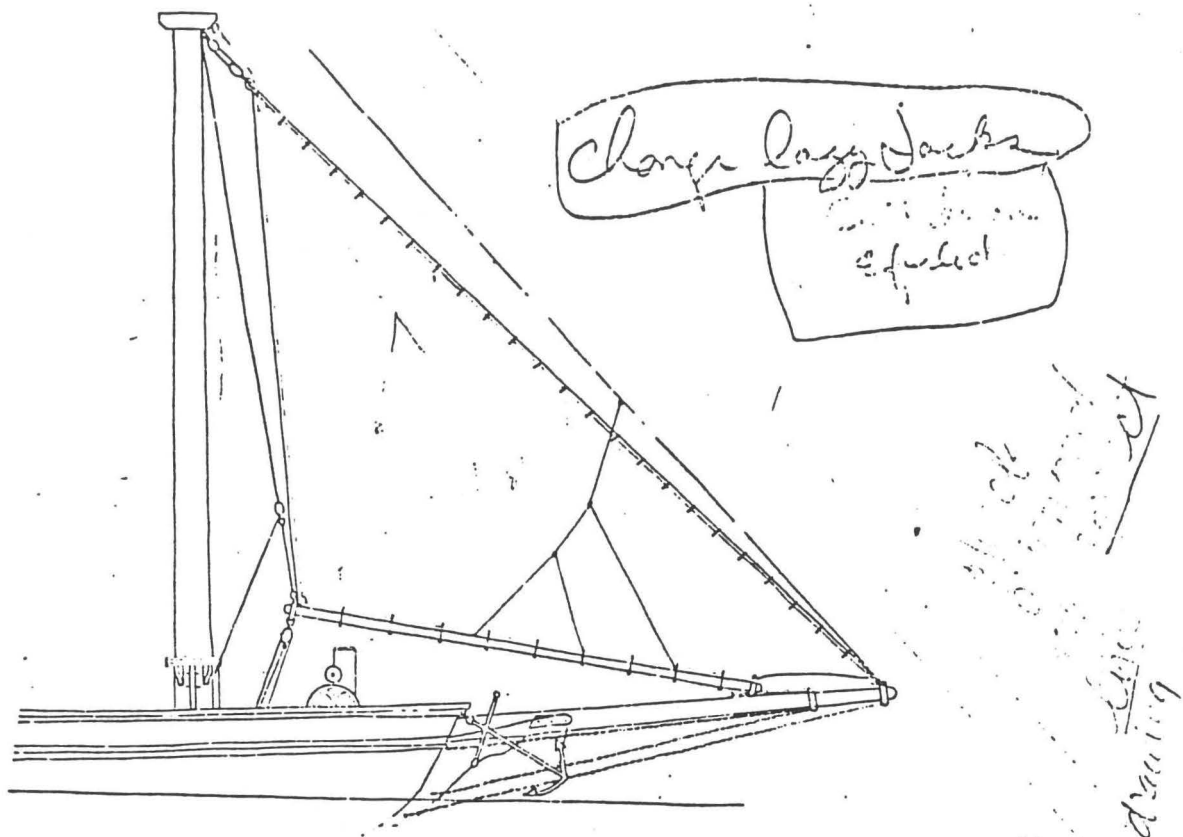
ILLUSTRATION - HAULING
ON THE HALYARDS OF THE FORE
SHOW MAN TO BELL POPE

8. When the order is given belay the halyards and man the purchases.
The Peak purchase is now on the starboard side and the throat on the
port. DON'T GET THEM MIXED UP!

ILLUSTRATION SHOWING FORE SHROUDS
AND LOCATION OF HALYARDS & PURCHASE
ON DECK - COPY ALSO ILLUSTR.

Once the sail is set to the mates' satisfaction, then

9. Slack the topping lift so that the weight of the boom is carried by the sail.
10. Make up all lines. The port and starboard crews should make up the halyards and purchases, while the remainder of the crew does the same for the lines they were working with.
11. One crew member will be assigned to tend the sheet by the mate. While the remainder of the crew is making up lines the sheet should be trimmed at the mates direction.



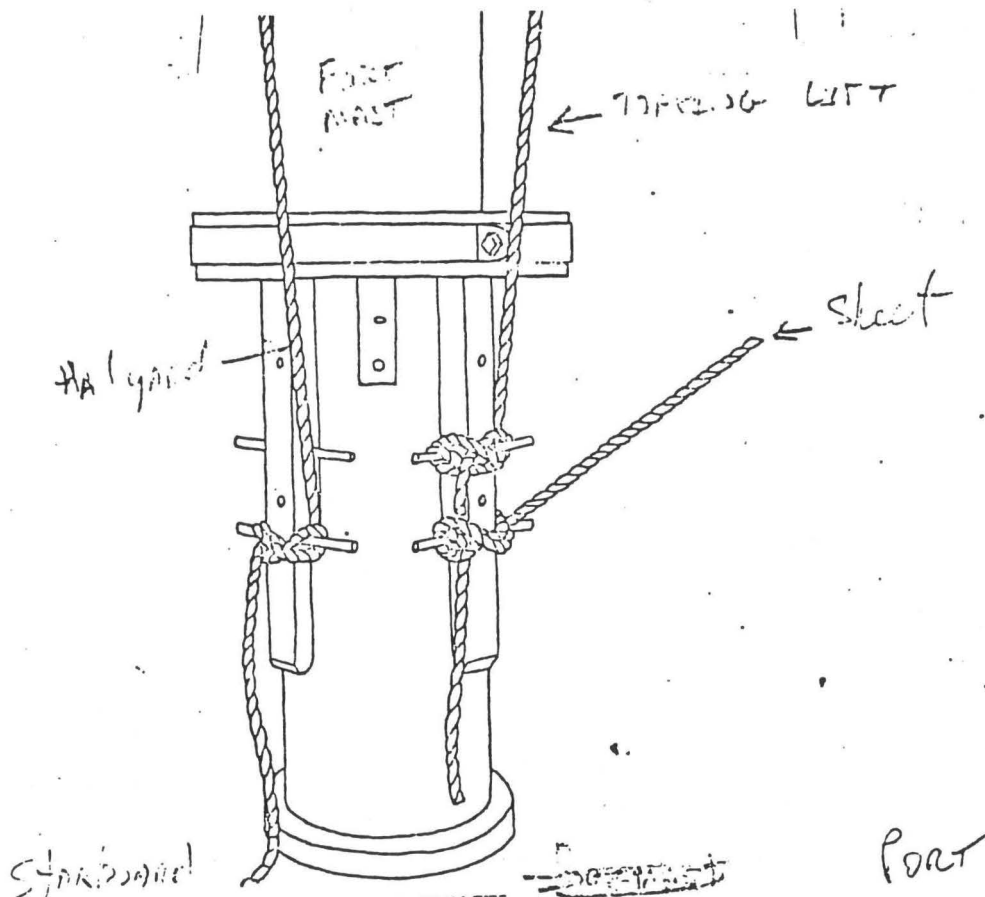
Unlike the main and the fore the staysail is ^{FURLED} ~~lashed~~ to its' boom by the down haul. This line is made fast to a pin in the forward port corner of ALMA when the sail is set, but when the sail is furrled it is made fast to the end of the boom with a clove hitch. Because the downhaul must run paralell to the luff of the sail, it is reeved through a block near the tip of the bowsprit. This allows us to lash the sail with a slippery hitch which is formed by taking a bight and forming a loop. A second bight is grabbed from the opposite side of the boom as the first, and pulled through the first forming a new loop. Another bight is grabbed (again from the opposite side)

ILLUSTRATION SHOWING THE START OF
THE STAYSAIL CREEPING & THE FORMATION
OF THE SLIPPERY HITCH

... pulled through this loop, forming a new loop, and so on until the entire sail has been lashed.

The advantage of this type of lashing can be seen as we look at the steps to raising the stay sail:

1. Undo the clove hitch at the end of the boom, pull the end of the lashing line (the down haul) free, and pull straight back. The lashing will slip through itself, and the sail will be free to be raised.
2. Set the sheet tight. You will find the stay sail sheet bent to the lower cleat on the forward side of the mast.



3. As an adult crew member goes out on the bowsprit (to make sure the sail does not foul as it is raised) find the halyard (lower cleat on the starboard side of the mast) and make it ready. DO NOT PULL ANY LINES UNTIL THE ORDER IS GIVEN! THE PERSON ON THE BOWSPRIT COULD BE KNOCKED OFF EASILY IF THE WRONG LINE IS PULLED AT THIS TIME.

4. Attached to the clew of the stay sail is the CLEW OUTHAUL. This line runs from the after corner of the sail, through a wooden ring on the boom to a cleat on the port side of the boom. One crew member will have to work this line as the sail is being raised, for it is this line which stretches the sail to the full length of the spar. A second crew member will be working next to the clew outhaul person slipping the lashing on the boom as the outhaul is taken in.

ILLUSTRATION PORT SIDE OF
BOOM SHOWING OUTHAUL LEAD &
SAIL CASINGING TO BOOM.

5. The above step will be taking place as the sail is being raised by the halyard. When the sail is two-thirds of the way up, stop and belay the halyard.

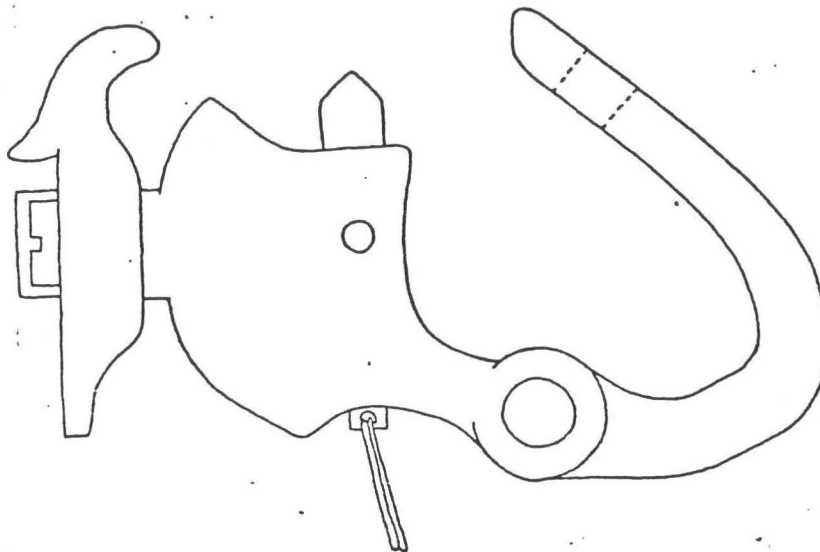
6. Loosten the sheet. Allow enough slack to be able to lift the boom out of its' crutch.

7. Man the topping lift (the top cleat on the forward side of the fore mast). Raise the boom so that it clears the top of the windlass, and belay the topping lift.

8. In order for the sail to set properly the boom must be as far aft as possible. To accomplish this the crew should pull aft on the spar until it reaches the end of track in which the forward end runs.

ILLUSTRATION OF END OF POWSPRIT -
PORT VIEW SHOWING DOWNHAUL LEAD,
AND STAYSAIL BOOM ATTACHMENT SHEET END
AFT ON TRACK.

passes through a single block at the top of the mast., There is a
each
snap shackle at end of the halyard so it is simple for the FORE



SNAP SHACKLES

CREW to attach the halyards to the throat and peak of the sail. Once the halyards are bent be careful not to pull the line before the order is given, for should the sail fill prematurely someone is going to get hurt.

4. As the order to raise the fisherman is given by the first mate, the FORE CREW pulls on both peak and throat halyards at the same time. Both the MAIN SAIL CREW, and the STAY SAIL CREW will pay out the sheets. CARE MUST BE TAKEN, FOR AS THE SAIL LUFFS (bangs around in the unsteady airs before it completely fills) THE SHEETS WILL SNAPPING AROUND WITH A GREAT DEAL OF FORCE. Make sure that all unnecessary crew members are clear of the area, and that everyone working on the sail does so with care.
5. As the sail is peaked by the FORE CREW, the order will be given to take in on the sheets. Again listen for the orders of the mate as he directs the tuning of the sail.
6. Once all lines are made fast, they should be made up and stowed properly.

LOWERING SAIL

The way in which a ship lowers her sails shows everyone who is watching what type of crew she carries. It can be a neat, well ordered process, or a scene of chaos... Again the critical thing to remember is LISTEN TO ORDERS, AND OBEY THEM! The sails are listed in the order in which they are lowered.

THE FISHERMAN SAIL

Unlike any of the other sails the fisherman is lowered every time ALMA comes about (tacks). Also, because unlike any other sail on board the sail is attached only to its lines great care, coordination and teamwork are needed. The same crews will be manning the same lines on the fisherman as when raising sail (FORE CREW ON THE HALYARDS, MAIN CREW ON THE AFTER SHEET, AND STAYSAIL CREW ON THE FORWARD SHEET.) When the order is given to drop the fisherman only two members from the fore crew should ^{EACH OF} man the halyards. The other crew members should be prepared to grab the foot (bottom edge) of the sail as it comes on deck. REMEMBER TO KEEP A GOOD TURN AROUND THE BELAYING PIN WHEN LOWERING ANY SAIL.

As the halyards are slacked the main and stay sail crews will be taking in on the sheets until the sail is close enough to the deck to be grabbed by hand. At this time the sheets AND HALYARDS should be released and the canvas gathered to deck as quickly as possible.

If the fisherman is being lowered for a tack, the sheets will have to be carried around the shrouds (by their respective crews), and the sail across deck by the remaining crew members. CARE MUST BE *taken not to put a twist in the sail as it is carried across deck.*

The fore crew should double check the position of the head (top edge) of the sail before bending on the halyards for the next tack.

As the sail is being carried across deck the stay and main sail crews will have to see that the sheet blocks are transferred to the opposite side of the deck, and secured to their chokers there.

If the sail has been lowered for the last time, it will be folded and stowed under the direction of the FORE CREW MATE.

THE
LOWERING STAY SAIL

Once the fisherman is down, the Captain will bring ALMA into the wind to ease the pressure on the sails, thus making it easier to lower sail.

1. Sheet the sail in thight. If wind conditions permit center the boom in the crutch. Be ware of fingers and hands if the boom is banging back and forth.
2. The crew leader goes forward on the bowsprit to furil the sail as it is brought down.
3. One crew member should tend the down haul, and assist in pulling the sail down if it hangs up.
4. Two crew members will be assigned to release the outhaul and push the sail lashings forward as the sail is lowered.
5. Release the halyard. This line has all the strain on it so care should be taken to keep a turn on the horn as long as it is needed. but not so long as to delay the lowering of the sail. The sail should be dropped as fast as it can be furrled.
6. Once the sail is down the crew leader will begin lashing the sail with the down haul. The crew person assigned to the downhaul should pay the line out to the crew leader as it is needed for the lashing.
7. Secure all lines and make up proper coils.

LOWERING THE FORESAIL

1. Free the halyards by removing the coiled lines from the pins and seeing that they are ready to run (working end on top of the coil, coil neat and free of tangles.)
2. Man the peak and throat downhauls.
3. Center the boom with the sheet. Heave it in tight, and belay.
4. Rig the topping lift to the tip of the boom, and take up on it until it takes some of the weight.
5. Prepare to furl the sail by placing gaskets into place and lining the crew up on either side of the boom.
6. Lower the sail. The crew members on the halyards must be alert for trouble. The gaff must come down evenly with the peak only slightly higher than the throat or the jaws may jamb. The furling crew folds the sail as it comes down, back and forth over the boom in a neat, accordion-like fashion. As the sail is furled it must be pulled aft to insure^a proper furl. The halyard crew should lower the sail as rapidly as it can be furled.
7. Once the sail is down and the gaff stabilized the gaskets can be made fast. They should pass over the gaff, and back under the sail before being bent with two-half-hitches.
8. Make up all lines, and stow them properly.

FURLING THE TOPSAIL

1. Free the furling line and stand by.
2. Free the tack line, and begin taking in on the furling line.
3. Free the clew line. Continue to take in on the furling line while releasing the tack and clew lines. Take in as much of the sail as is possible, then
4. Begin lowering the sail by the halyard, while taking up on the furling line. This action should have resulted in the sail being furled into its "hamper", however, sometimes it will take some work with both tack, clew, and furling line to achieve a proper furl.

5. Coil all lines, and make ready to furl the main.

LOWERING THE MAIN SAIL

1. Free the halyards and prepare them to run.
2. Man the downhauls
3. Center the boom with the sheet. At the same time prepare to raise the crutch from the cutty top. It may be necessary to hoist on the topping lift to set the crutch. Once in place set the sheet tight and man the halyards.
4. Those persons not responsible to the halyards should be setting the gaskets in place while the other sails are being lowered. As the crutch is set they should position themselves on either side of the boom in preparation for furling.
5. Lower the sail by the halyards being careful to keep the gaff at the proper angle (peak even with or slightly higher than the jaws). As the sail comes down it should be neatly folded back and forth across the boom, and worked aft as it is folded. When the gaff is down to its proper place, the gaskets should be set and lines made up.

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ILLUSTRATIONS TWO OR THREE TYPES OF ANCHORS

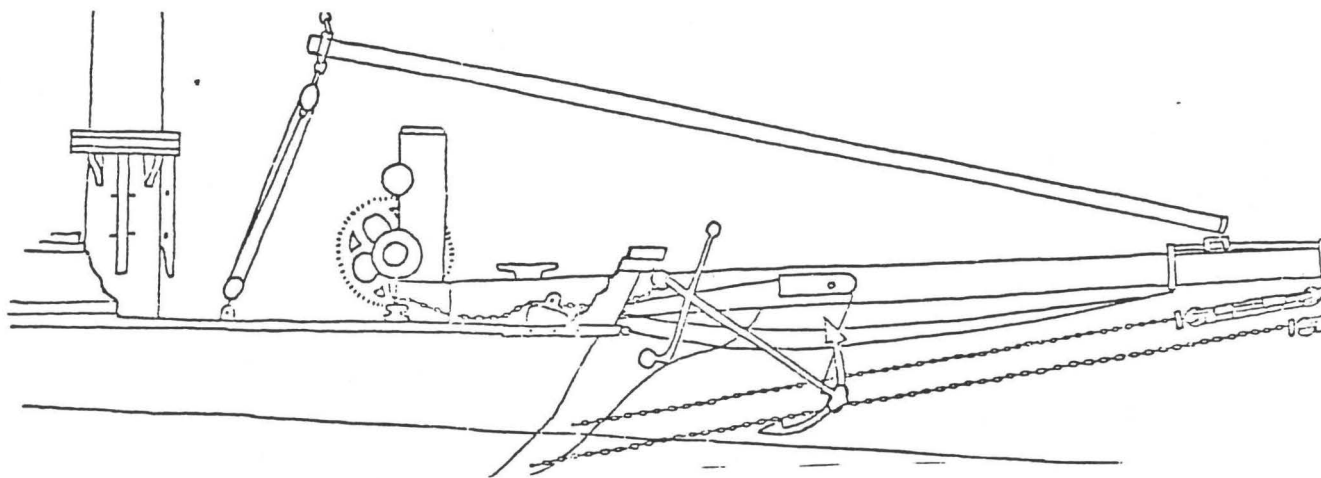
An anchor is a devise which allows a ship to tie-up when there is nothing to tie to. Traditionally ships have used anchors for more than ground tackle, for without an engine, there is but one way to stop a ship (without running aground) and that was to drop anchor. Ships wishing to moore closer to land than it was safer to sail from would often drop anchor off shore and let the wind and current push their ship closer to shore, where a second anchor would be dropped. When it was time to leave, the crew would raise first the anchor they dropped close to shore, then they would pull their ship (or WARP it) out again where they had enough sea room to set sail. On scows like ALMA the anchor would be used to move up river when either the winds were not favorable, or there was not room to manouver. In this process (again called WARPING) a small anchor would be lowered into a boat, rowed out as far as the line would permit, dropped, and the ship warpped up to the small anchor (or KEDGE ANCHOR), where the main anchor would^{again} be dropped, and the process repeated.

ANCHORING PROCEDURES ON ALMA

ALMA carries three anchors: two large "stocked anchors" hang from the bow, and one small anchor which can be used as a heaving or kedge anchor. Normally it is this small anchor which is used first; if it does not hold then one of the main anchors is lowered.

To drop the heaving anchor one or two crew members will be needed. First, check the bitter end -- the name will ring true if the anchor is cast off when the end is not tied off! While checking the bitter end it is a good idea to inspect the entire foredeck area. Are there any tools (or personal gear) which might foul in the anchor line? Is the line free to run, or is it tangled? If all looks clear, and the Mate so directs, then the anchor chain can be lead to the chock on the bow rail. Once the chain has a fair lead, the anchor can be carried to the side and carefully lowered between the bowsprit and the bobstay. Once in the water the line can be released, and the captain can be notified with a loud clear call of "ANCHOR AWEIGH!" BEFORE RELEASING THE LINE MAKE SURE ALL PERSONS ARE CLEAR OF THE ANCHOR LINE AND THE PATH IT HAS TO LEAD!

THE MAIN ANCHORS



Take a look at the main anchor and how she is rigged. The ANCHOR CHAIN comes out of the deck through a hole and leads to a clamp which is used to secure the chain. This CHAIN STOPPER usually has a metal pin through one of the links to insure the chain will not run out accidentally. From here the chain runs through a hole in the bow (the HAWSEPIPE) to the anchor where it is attached to the ANCHOR RING by a shackle. In order to keep the anchor from being released

accidentally there is also a place for the ring to be tied. The piece of wood which passes through the bow and to which the anchor ring is tied is called the CATHEAD, and the small piece of line or chain which secures it is called the CATHEAD STOPPER.

Notice too the line that runs from the winch head to the fluke of the anchor, and over a sheave on the side of the bow sprit. This ANCHOR TRIP LINE can be very helpful if the anchor becomes stuck because it provides another angle to try to pull it free (or trip it) from. The anchor trip line also comes in handy in lowering anchor:

PROCEDURES FOR DROPPING MAIN ANCHOR

1. Remove the cover from the deck hole through which the chain passes, and clear the chain stopper for action (don't forget to remove the pin).
2. Double check the trip line, make sure it is ready to run, and is attached securely to the winch head AND IN THE PROPER DIRECTION!
3. Clear the area, as if the anchor was going to run, and clear the cat stop allowing the full weight of the anchor to fall on the trip line.
4. Loosen the trip line and gradually lower the anchor to the bottom. When the weight is on the bottom, remove the trip line from the winch head, and attach a float. Cast that over board and notify the captain "ANCHOR AGROUND"
5. When the captain has determined there is sufficient anchor line out the order will be given to belay. Take three turns around the winch head, and finish with two half hitches in the bight.

PROCEDURES FOR RAISING ANCHOR

1. Remove the half hitches from the anchor line, have a crew member tail the line as it comes off the winch head, and guide it down into the chain locker.

2. Attach the winch handles and crank the anchor line in until the trip line float is along side. Bring the trip line inboard remove the float, and take three turns around the
3. Take three wraps around the upper winch head with the trip line and begin taking the strain by continued cranking. At the same time begin slipping the anchor line around the lower head so that the trip line will do the work of pulling the anchor out of the bottom.
4. Once clear of the bottom let the anchor line take the strain of the anchor until it is clear of the water.
5. When the anchor ring clears the surface, bring the flukes up by the trip line. A double purchase tackle will have to be rigged to pull the anchor ring back to the cathead. When in place, run the cathead stopper through the anchor ring and secure.
6. Lock the chain stopper, and replace the pin. Secure all lines and see that all equipment is properly stowed.

ABOARD. In or on a ship or other floating vessel. On the deck or in the hold of a ship. Sometimes called on board.

AFLOAT. In a floating condition; the converse of aground.

AFT. In, near, or toward the stern of a vessel.

AGROUND. When a vessel rests on something solid other than the blocks in a drydock or slipway she is said to be aground. A vessel "takes the ground" when the tide leaves it aground for want of sufficient depth of water, a fairly frequent occurrence in open docks.

AHOY. An exclamation to attract the attention of persons at a distance when hailing a vessel or boat.

ALEE. On or toward the sheltered side of a ship. Away from the wind. Also called to leeward.

ANCHOR. A heavy forging or casting comprising a shank with large shackle or ring at one end and two arms with palms at the other, so shaped as to grip the sea bottom, and by means of a cable or rope hold a vessel, boat, or any other floating structure in a desired position regardless of wind and current.

ANCHORAGE. A place where a ship anchors or may anchor. An area set apart for anchored vessels in a harbor. A suitable place for anchoring is sheltered from wind and sea, does not interfere with harbor traffic, and has a sea bottom that gives good holding to anchors. The anchorage space allotted to a vessel should include a circle with a radius equal to the combined length of anchor cable and ship. A depth of 7 to 8 fathoms at low water is usually considered sufficient for ordinary requirements.

APPARENT WIND. The variation from the true wind caused by a vessel's speed. The wind felt by an observer on a moving vessel. It is the resultant of the actual motion of the wind and a motion equal and opposite to that of the ship.

ASTERN. Toward the stern. An object or vessel that is abaft another object or vessel. In nautical language the word behind is never used.

AUXILIARY POWERED VESSEL. A vessel fitted with both sail and machinery for propulsive purposes. The term is not restricted to any particular rig or type of machinery, nor is there a limit to the power installed, below which a vessel is a sailer and above which it is considered as a mechanically propelled vessel.

BACKSTAYS. Ropes forming part of the standing rigging. They stretch from mastheads (except with lower masts) and tend aft from the masts. Their lower ends are fastened on each side of the ship to the chain plates. They serve to support the masts against forward pull and are named according to the mast they support.

BALLAST (IN). A ship is said to be in ballast when it carries no cargo, but only ballast. A yacht, in marine parlance, is always considered in ballast.

BALLAST. Heavy material placed low in ships used to maintain proper stability, trim, or draft.

BARGE. 1. A term applied to a flag officer's boat, in naval usage, or to an elegantly fitted boat, or craft of ceremony, propelled by oars or mechanically, and reserved for the use of high officials when transported in state; 2. Also lighter. A general name given to flat-bottomed rigged or unrigged craft of full body and heavy construction (built of wood, concrete, iron or steel) specially adapted for the transportation of bulky freight such as coal or lumber, sand, stone, and so on. Some types trade solely on rivers and canals but a great number are built and equipped for short-distance coastwise traffic.

BARNACLE. - A small, primitive marine animal with a calcareous shell, which in its adult form lives attached directly by its base to some foreign object, such as a ship's hull, wharf piles, and the like. Its distribution is worldwide; however, only certain species are found over wide areas or in different localities. The young animal is free-swimming for as long as 2 or 3 months, then it attaches itself to a suitable surface and takes up permanent abode. Thereupon it commences to secrete the shell, which grows both in diameter and height as the animal matures. After it has formed this shell house, toxic ship-bottom paints will not affect it.

Although immersion in fresh water for 48 hours will kill the animal, its shell will remain attached to a ship's bottom until removed by scraping.

The barnacle is a persistent and troublesome source of fouling on ship's bottoms.

BATTEN. 1. A thin strip of clear white pine, used in fairing the ship's lines in the mold loft. 2. A thin straight strip of wood used as an auxiliary for reference or measurement: (1) in erecting structures, during the vessel's building, (2) in setting up a drydock to receive a ship. 3. Name given in the timber trade to pieces of soft wood, 6, 7, or 8 in. wide; 2, 2½, 3, and 4 in. thick; 5 to 30 ft. long.

BATTEN DOWN. To cover up and fasten down. Usually said of hatches when they are covered up with tarpaulins, which are fastened down with hatch battens.

BEAM. The width of a ship.

BEARING. The direction or point of the compass in which an object is seen, or the direction of one object from another, with reference to (1) the nearest cardinal point of the compass, or (2) true north, measuring clockwise

BEAT. To make progress against the wind (and therefore close-hauled) by a zigzag course with the wind first on one bow and then on the other.

BECALMED. 1. Said of a sailing vessel unable to make progress owing to lack of wind. 2. The condition of a sail or vessel cut off from wind by other sails or another vessel.

BELAY. To take one or more "S" turns with a rope around a cleat or belaying pin, without tying it in a knot. Also, to cancel an order.

BELAYING CLEAT. A piece of wood or metal with single or double horns used for belaying ropes.

BELAYING PIN. A short bar of iron, brass, or wood used for belaying ropes of the running rigging.

BELAYING PIN RICK. A framing of wood or iron fitted with belaying pins. Sometimes called pin rack.

BELL. A bell and clapper of the usual shape used aboard ship as a means of announcing time at regular intervals, as a signal when the ship is anchored in a fog, or as an alarm in emergencies. Sometimes called ship's bell, fog bell.

BEND.(to). 1. To fasten by means of a bend or knot. A general term for fastening anything as to bend one rope to another, the anchor to its cable, and so on. 2. To bend a sail is to make it fast to its proper yard, gaff, or stay ready for setting. 3. A method of fastening one rope to another or to a ring, loop, and so on, by passing the rope through a loop and fastening it back around its own end.

BERTH. 1. The shelf-like space allotted to a passenger or member of the crew as a sleeping place. 2. The place assigned to a vessel in port when anchored or lying alongside a pier, a quay, a wharf, and so on where it can load or discharge.

BIGHT. 1. The bend or loop in a rope. The double part when it is folded. In knotting, that part of the rope between the end and the standing part. 2. A slightly receding bay or recess in a seacoast between comparatively distant headlands. Long and gradual bend of a coastline.

BILGE. The lower internal part of the hull, adjacent to the keelson, where the bilge water collects. In vessels with a double bottom, the triangular channel or waterway formed by the tank margin plate and the curvature of the outside shell. It runs fore and aft and is subdivided into sections by the ship's transverse bulkheads.

BILGE PUMP. A pump used aboard ship to remove accumulations of water in the vessel's hold and other compartments and discharge it overboard. Bilge pumps are often geared to and from part of the main engines when these are of the reciprocating type. When fitted with the necessary connections to the bilge system, sanitary, ballast, and general service pumps are usually considered as independent bilge pumps.

BITE. The short end of a rope sling through which the long end or rove is passed before it is hooked to the cargo whip.

BITT. A strong post of wood or iron for belaying, fastening, and working ropes, cables, mooring lines, and so on. Bitts are usually in pairs, named according to their uses. Although also called bollard, the latter term is more generally applied to a cast-iron or timber post fixed on a pier or quay for securing mooring lines.

BITTER END. The inboard end of the anchor cable. It is usually rove through a ring at the bottom of the chain locker and brought up and made fast to a beam or other accessible place by a sliphook or lashing, which admits of easy slipping if required.

BLOCK. A mechanical contrivance consisting of one or more grooved pulleys mounted in a casing or shell fitted with a hook, eye, or strap by which it may be attached.

Blocks are used for transmitting power or changing the direction of motion by means of a rope or chain passing around the moveable pulleys. They receive different names according to their shape, purpose, or mode of application. Many of the blocks used on board ship are named after the ropes or chains rove through them. Blocks for marine use must be of substantial construction. The general practice is to use steel blocks with wire ropes and wood blocks with fiber ropes. They are made with a great variety of shackles, hooks, jaws, eyes, eyebolts, etc., to meet the particular requirements of the service intended. Steel block sizes are usually given in inches according to diameter of sheave and wooden block sizes according to length of shell.

BOARDING. Hailing and entering a vessel officially in order to examine her papers and her cargo or to ascertain the sanitary conditions of the crew and passengers on entering a harbor. Boarding is usually performed by the harbor medical officer and is compulsory for all vessels coming from the high seas. Government vessels, pilot vessels, small fishing vessels, and in general craft that remain close to the shore are not boarded when coming into a harbor.

BOAT PAINTER. A rope attached to the stem ringbolt of a small boat, used for securing it. A short piece of rope secured in the bow of a boat, used for towing or making fast.

BOATSWAIN'S CHAIR. A oak board about $3/4$ or $7/8$ in. thick and 24 in. long with four holes, one at each corner. It has two pieces of line about 6 ft. long formed into loops with ends passed through the holes in the board and spliced on the under side and is hoisted aloft by a whip. It is used for sending a man aloft where foothold is not obtainable, as when painting or doing rigging work.

BOATSWAIN'S LOCKER. A small compartment in which are kept tools and small stuff for repairing and making up rigging or cargo gear.

BOBSTAY. A rope, chain, or iron rod that extends from bowsprit end to stem and counteracts the lifting strain of the forestay.

In craft rigged with a reefing bowsprit, as the outboard length of the spar varies the bobstay is set up with a tackle. A gun tackle is used and hooked into the end of the bobstay and the lower eye of the crane iron. The fall comes inboard and is fastened to a cleat at the bowsprit bitts.

BOOM. A general name given to a projecting spar or pole that provides outreach for extending the foot of sails, or mooring boats, handling cargo, bearing a ship away from a quay wall, and so on.

BOOM CRUTCH. A portable fitting for resting the main boom of small fore-and-aft rigged craft when in port. A stanchion to support the lowered end of a cargo boom at sea. Also called boom rest, cradle or derrick support.

BOTTOM. 1. The portion of a vessel's structure between keel and lower turn of bilge. 2. The term bottom is also applied in a general sense to the whole of the ship's surface below the waterline.

BOW. The forward part or head of a vessel, more particularly above waterline, beginning where the sides trend inward and terminating where they close or unite in the stem. Also, the forepart of a vessel forward of the greatest transverse section.

BOWSPRIT. A spar which projects forward from the stem of a sailing boat or vessel. Its purpose is to extend the head sails, thereby counteracting the effect of the after sails and keeping the sail plan balanced. It is also one of the main supports of the foremast, which is fastened to it by stays.

BOWSPRIT BITT. One of the strong upright timbers secured to the beams below deck and serving as bowsprit step. A crosspiece prevents the bowsprit from slipping in or canting up. Called also bowsprit heel bitt, Samson post.

BRASS. Generic term for various nonferrous alloys of copper and zinc to which small percentages of other metals such as manganese, nickel, lead, and tin are added to give special properties. Castings of ordinary commercial brass have a tensile strength of 20,000 lbs. per sq. in. Forgings have a tensile strength of 40,000 lbs. Brass castings are used for deck plates and caps, drain plugs, name letters, number plates, scupper pipes, skylight hinges and so on.

BREAKWATER. A small athwartship or V-shaped coaming abaft the nawse holes on the forecastle, acting as a protection against the seas shipped over the bows and preventing the water entering through the hawse pipes from rushing aft by diverting it to the ship's sides.

BROACH TO. Said of a vessel under sail when running with the wind on the quarter. The ship's head comes up suddenly toward the wind in consequence of a sea striking the stern or through bad steering. A frequent cause of dismasting or loss of spars.

BROAD REACH. Said of a sail boat when sailing with the wind a little free but still forward of the beam.

BRONZE. A generic name for nonferrous alloys with copper and tin as the principal elements, to which zinc is added to soften them and assist in making sound castings, and lead as a softening element to improve the machining qualities. Other metals are sometimes introduced for special purposes.

BULWARKS. 1. The raised woodwork or plating running along each side of the vessel above the weather deck helping to keep the decks dry, and serving also as a fence against losing deck cargo or men overboard. 2.

The upper section of the frames and side plating, which extends above and around the upper deck.

UPPER (U.S.).

BUOY. A floating object employed as an aid to mariners to mark the navigable limits of channels, their fairways, sunken dangers, isolated rocks, mined or torpedo grounds, telegraph cables, and the like. An anchor buoy, made fast by a line to the anchor is used to mark the position of a ship's anchor after letting it go. Mooring buoys are used for securing a ship in lieu of anchoring. They vary in size and construction from a log of wood to the large steel mooring buoys used for ocean liners

BUOYANCY. The resultant of upward forces, exerted by a liquid upon a floating body equal to the weight of water displaced by the body.

BURDENED VESSEL. The vessel which according to the rules of the road for two approaching vessels should keep out of the way of the other one.

BURGEE. A swallow-tailed flag used as a distinguishing pennant by yachts and merchant vessels. In merchant vessels it often bears the name of the vessel. On yachts it usually bears the insignia of the owner's club. There are two burgees in the International Code of Signals: Letters "A" and "B". The relative dimensions of a burgee are usually one-half the length at heading and one-fourth at swallow tail.

BY THE WIND. Sailing as nearly to the direction of the wind as the ship will lie with her sails full. In sailing-ship parlance, within six points of the wind. Also called on the wind, on a wind, upon a wind.

CABIN TOP. A built-on structure extending from abaft the mast to the cockpit, in small craft, leaving waterways on each side. Its purpose is to provide head room below deck. It may have a skylight on top and ports in the sides. Also called coach roof, trunk cabin.

CABLE. A heavy fiber or wire rope or a chain. The term is most frequently used, in its nautical sense, to indicate the means by which a ship is connected with her anchor.

CALKING; CAULKING. Forcing a quantity of caulking material into the seams of the planks in a ship's decks or sides to make them watertight.

CALM. The state or condition of the atmosphere when there is no wind.

CAMEL. A heavy fender float used for keeping a vessel off a wharf or quay, usually consisting of four square logs bolted together.

CANVAS. A double-warp, single-weft fabric made of hemp, flax, or cotton fibers, used for making sails, awnings, covers, tarpaulins, etc. Also called sailcloth.

CAPSIZE. To turn over; to upset. The capsizing of a ship is caused by the elevation of the center of gravity above the metacenter, thus creating an unstable equilibrium.

CARGO HATCH. The general term applied to any deck opening leading to the cargo holds.

CATHEAD. A beam of wood or metal projection over each bow, having sufficient outreach to support a stocked anchor clear of the ship's side either before letting go or previously to stowing on board. There is an eye underneath and a thumb cleat on the side to take the catting chair--one or two sheaves are fitted on the outboard end for the cat-fall. In former days the end of the cathead was carved to represent the head of a cat; hence the name.

CAVITATION. A phenomenon occurring under certain conditions during the rotation of a screw propeller, wherein air cavities are formed in contact with the propeller blades, reducing its thrust, and thereby reducing propulsive efficiency.

CEILING. In meteorology the height of the cloud base above the earth's surface.

CELESTIAL NAVIGATION. The methods of determining the ship's position at sea by astronomical observation of the sun, moon, stars, and planets.

CENTERBOARD. A movable fin or sliding keel made of wood or metal, pivoting in a fore-and-aft slot at the forward lower corner. Its purpose is to increase the area of lateral resistance when a sailing boat is working to windward, and to prevent excessive leeway. It is raised or lowered by means of a pendant let into the afteredge. It is used mostly in small sailing boats and yachts whose draft is less than about one-third of the breadth. Also called drop keel, center plate, pivoting centerboard.

CENTERBOARD TRUNK. The watertight casing or slot inside which a centerboard is housed when raised. Also called centerboard case.

CENTERBOARD PENDANT. The rope by which a centerboard is pulled up or lowered.

CENTER OF EFFORT. The point at which the resultant of wind on the total surface of the sails may be conceived to act. Also called center of pressure.

CHAFING. The action of being fretted and worn by rubbing; applies to ropes, parts of the ship's structure, cargo, and so on.

CHAFING GEAR. Various devices such as mats, battens, strips of leather, canvas, baggy-wrinkle, worming, parcelling, roundings and service of all kinds in the rigging to prevent injury by chafing.

CHAIN LOCKER. A compartment located forward, under the windlass, in which the anchor cables are stowed. It is usually subdivided inside by a longitudinal bulkhead pipe fitted on each side of the vessel directly under the windlass to lead the anchor chains to the chain locker. Also called deck pipe, navel pipe, spill pipe, spurling gate. At the top end of each pipe a portable cover of galvanized plating with opening for the passage of the chain is provided. The bottom ends in the chain locker are fitted with a heavy half-round chafing ring.

CHAIN PLATE. ~~One of the strips of plating secured to the side of a ship to which the lower ends of the lower end of a shroud or backstay is fastened. Also called chain.~~

CHAIN PLATE. One of the strips of plating secured to the side of a ship to which the lower deadeye or the lower end of a shroud or backstay is fastened. Also called chain.

CHECK. A small split running parallel to the grain in a piece of timber usually caused by strains produced during seasoning.

CHECK (TO). 1. To slack off slowly; to stop a vessel's way gradually by a line fastened to some fixed object or an anchor on the bottom. 2. To ease off a rope a little, especially with a view to reducing the tension. 3. To stop or regulate the motion, as of a cable when it is running out too violently or too fast.

CHOCK. A heavy wooden or metal fitting secured on a deck or on a dock, having jaws through which line or cable passes, and for which it serves as a fair-lead.

CHOPPY SEA; CHOPPING SEA. Tumbling waves dashing against each other with a short and quick motion.

CLEAT.

CLEW. One of the two lower corners of a square sail. In all triangular sails and in four-sided sails where the head is not parallel to the foot the after lower corner is the clew.

CLUB FOOT.

COIL. A quantity of rope made up into a series of rings lying close one above the other. Rope is sold by the coil, which contains 200 fathoms standard length. Rope in 100-fathom lengths is called half-coils.

COIL (TO). To lay a rope down in circular turns. If the rope is laid up right-handed it is coiled from left to right and vice versa if laid up left-handed.

COLLISION. The act of ships or vessels striking together. In marine insurance it is immaterial whether the vessel collided with is engaged in the performance of a voyage or is in a state of wreck. But collision with stationary objects, such as piers, landing stages, and dock gates is not included among the risks covered under the term collision.

COMPANIONWAY. 1. Steps leading from a companion hatchway to a cabin or saloon below deck. Also called companion ladder. 2. A steel or wooden hood with doors built over a small hatchway on a weather deck, house top or cockpit, for covering and making weathertight an entrance to the deck below. The top is sometimes sloped but in most cases it is circular and fitted with a sliding cover. Also called companion.

COMPASS BEARING. A bearing stated as a compass direction and expressed as a compass course, that is, in degrees and fractions of a degree.

CRUSTION. Deterioration of metals due to oxidation or rusting. On iron and steel it is chiefly due to the action of carbonic acid contained in water and humid air. It is aggravated by the salts present in sea

water. Protection against corrosion usually involves a protective coating which keeps oxygen away from the metal surface.

COURSE. The direction is which a ship is steered in making her way from point to point during a voyage. The point of the compass on which a ship sails. Also called tract. Courses are measured from the north clockwise in degrees to the fore-and-aft line of the vessel.

CREW. The company of seamen or seafaring men who man a ship, vessel, or boat. In a broad sense it includes all the officers and men on board a ship who are on the articles. In a more restricted sense it is applied to the men only, to the exclusion of officers. Also called ship's crew.

CUDDY. A cabin or cook room at forward or afterend in a lighter, barge, or other small craft. A locker in a small open boat. Also a wooden platform situated in the stern of a boat upon which a drift net is coiled.

DEADEYE. A stout disk of hard wood, strapped with rope or iron, through which holes (usually 3) are pierced for the reception of lanyards. They are used as blocks to connect shrouds and chain plates.

There is a groove in the circumference in which the strap, in the lower deadeye, and the bight of the shroud in the upper deadeye, lies. Lower deadeyes have a metal strap with the ends bolted to the upper part of a shank holding them to the body of the ship.

DECK. A principal component of the ship's structure, consisting of a planked or plated surface, approximately horizontal, extending between the ship's sides, and resting upon a tier of deck beams. A deck serves as a working surface, or flooring, and also as a divisional structure which subdivides the ship. The uppermost complete deck forms a weather-tight, and usually watertight, covering. Decks also form parts of the ship girders; that is, they contribute to the structural strength and rigidity of the hull.

DEPTH. The vertical distance measured at the middle of the vessel's length from top of keel or top of ceiling to top of upper deck at sides, or amidships. The designed depth depends on the draft and freeboard required.

DIESEL ENGINE. An oil engine working on the following principle: air is drawn into a cylinder and compressed to a pressure sufficiently high to raise the temperature so as to insure auto ignition of oil fuel injected into the cylinder at the end of compression at a graduated rate. The working pressure in the cylinder does not rise above the compression pressure. After combustion is complete, the gases expand adiabatically to the end of the stroke. The gases are then exhausted and the cycle starts again.

DINGHY. A small rowboat with transom stern, single-banked with 2 or 4 oars, used as an extra boat on merchant vessels. It is usually the smallest ship's boat.

DISPLACEMENT. The number of tons of water displaced by a vessel afloat (1 tone = 240 lbs.). The sum of light weight and dead weight is equal to the displacement.

DOCK (TO) To take, bring on, or receive a ship into dock.

DOCK (TO). To take, bring or receive a ship into dock.

DOCKING. The operation or charge made for assisting a vessel into a dock.

DOUBLING. The part of a mast included between trestletrees and cap, or that part where the heel of an upper mast overlaps the lower one.

DOWNHAUL. A rope by which a sail is hauled down when it may not be trusted to come down by its own weight.

DOWN THE WIND. The reverse of in or by the wind: that is to say, in the same direction the wind is blowing. Along the course of the wind.

DRAFT. Also draught. The depth of water which a ship requires to float freely. The depth of a vessel below the waterline, measured vertically to the lowest part of the hull, propellers or other reference points.

EASE. To ease the helm: to reduce the amount of helm when it is hard over. When sailing against a head sea this includes easing the weather helm, and luffing to meet the sea bow-on and at the same time deaden the ship's headway so that the ship and sea meet less violently.

EBB. The reflux or falling tide. The return of tidewater toward the sea. The term EBB is used only on marine charts when the stream turns within an hour of the corresponding high and low water. Also called ebb tide, ebb stream, ebb current.

ENSIGN. The flag carried by a ship as insignia of her nationality. The ensign is hoisted on a pole or staff over the taffrail. In sailing vessels at peak of gaff. If the aftermost sail is a Bermuda or Marconi sail the ensign is displayed at a point on the leech that would be the peak of an ordinary gaff sail. At anchor it is displayed at a staff on the taffrail to starboard of the boom if the latter extends beyond the taffrail. In port it flies between 8 a.m. and sunset: at sea only when saluting or meeting strangers. Turned upside down it is a signal of distress; half hoisted a sign of mourning.

ESTUARY. 1. An arm of the sea. 2. The tidal compartments of a river subject to tidal influence extending as far as the limit of palpable tidal action. 3. The coastal section of a river which is to a greater or lesser extent invaded by the sea and subject to tidal phenomena.

EYE. A nautical expression indicating the direction from which the wind blows. In a tropical cyclone the eye is the central calm area.

EYEBOLT. A bolt with an eye at one end.

EYE SPLICE. A loop spliced in the end of a rope. It is more frequently used than any other splice.

FAIRLEADER. 1. A strip of board with holes in it for running rigging to pass through. 2. Any ringbolt, eye, or loop which guides a rope in the required direction.

holding the outside plating or planking in shape and maintaining the transverse form of the ship.

FREEBOARD. The vertical distance measured on the vessel's side amidships from the load water line to the upper side of the freeboard deck or a point corresponding to it.

FUEL TANK. Oiltight compartment, designed to carry liquid fuel for the vessel's consumption.

FURL. To roll up a sail to its yard, boom, mast, or stay, and fasten it with a gasket to secure it snugly. Also called to take in.

GAFF. A spar for extending the head of a fore-and-aft quadrilateral sail, as the mainsail of a sloop or the spanker of a ship.

GAFF SAIL. A four-sided fore-and-aft sail extended by two spars, a gaff and a boom, which has its forward side or luff pivoting about a mast to which it is attached by hoops or slides. Gaff sails are laced, loose-footed, or boomless. In the first instance, the foot is either laced or stoppered to a wooden jackstay on tope of boom from tack to clew, or extended by a boomtrack with slides. In loose-footed gaff sails, only the tack and clew are secured to the boom. The bunt of the foot is left free to take up a curve under the pressure of wind. These sails are cut with a round in the foot amounting to 2 or 3 per cent of length, and are considered more efficient for cruising than the other types, but the boom must be heavier and the sail made of stouter material. Boomless gaff sails are not suited for yacht or deep-sea work; however, they are used on small coasters, and fishing boats on account of the ease with which they may be partially brailed up. Vangs are required on the gaff.

GALE. A wind between a strong breeze and a storm. A continuous wind blowing in degrees of a moderate, fresh, strong, or whole gale and varying in velocity from 28 to 55 nautical miles an hour.

GANGWAY. A narrow, portable platform used as a passage by persons entering or leaving a vessel moored alongside a quay or pier. It has a minimum width of 22 in. and is fenced on each side to a height of about 2 ft. 9 in. by means of a railing or taut ropes or chains. Also called gangboard, gangplank.

GASKET. Small line, canvas strap, or plaited stuff employed to secure a sail to a yard boom or gaff when furled. When used on yards they are called bunt gaskets, quarter gaskets, or yardarm gaskets, according to their location. Also called sail tier.

GEAR. The ropes, blocks, tackles, and the like, of any particular spar, sail, and so on, spoken of collectively. It is also a term of very general application which signifies arrangements of machinery for working pumps, rudder, anchors, cargo and so on.

GIVE WAY. To leave the way clear. To make room for.

ROUND. To run ashore. To strike the bottom through ignorance, violence or accident.

FENDER. Term applied to various devices, fixed or portable, serving to cushion the shocks and protect the shell plating when a vessel comes in contact with a quay wall, or the like, or another vessel.

FISHERMAN'S STAYSAIL. A sail set flying between the foremast and mainmast in small trading and fishing schooners. It is square on the luff and has two sets of halyards. One set leading through a block at the fore lower masthead and the other at mainmast head. It also has a tack and sheet to trim it down. It is roped on head luff and clew and made from a lighter cloth than the working sails. It is primarily a fair weather sail set with the wind abeam or abaft the beam.

FITTINGS. As used in marine insurance this term covers the permanent fittings of a vessel including those required for the particular trade in which she is engaged, the provisions for the crew and the fuel and engine-room stores.

FIX. A term denoting the determination of a ship's position by observations of celestial or terrestrial objects, or by a combination of both. This term is used only when the position so obtained is not open to doubt.

FOOT. 1. The lower edge of a sail. 2. The side of a fore-and-aft sail extending between tack and clew.

FOOT ROPE. Pieces of served wire rope extending under a yard from the middle to the yardarm, supported by stirrups, upon which the men stand when reefing or furling a sail. Footropes are also found beneath the overhang of the spanker boom of a schooner and under the bowsprit and jibboom. They are named according to the spar to which they are fastened.

FORE. A term used chiefly in words denoting some parts of a ship's framing, equipment, or machinery which lies near the stem or in that direction, in contradistinction to aft, also parts connected with the foremast.

FOREMAST. The mast before the main mast.

FORWARD SPRING. A line or hawser extending from well forward in the ship to a point on shore abreast of the ship's stern. It acts to check a vessel's forward motion. Also called bow spring.

FOUL. A word generally used in opposition to "clear," implying entangled, embarrassed, or contrary. An anchor is said to be foul when the cable is entangled.

FOULING. A generic term for the mass or organisms, animal and vegetable, which becomes attached to the underwater surfaces of a ship's hull while it is waterborne.

FRAME. One of the transverse girders forming the ribs of the hull and extending from the keel to the highest continuous deck. The term "frame" when used in a general sense includes a combination of three parts: frame bar, reverse bar, and floor plate. The frames act as stiffeners

GROUND TACKLE. A general term for the anchors, cables, warps, springs, and so on, used for securing a vessel at anchor.

GUNWALE. The upper edge of a vessel's or boat's side.

GYBE. When sailing free, to put the helm over so as to bring the boom on the opposite side.

To cause fore-and-aft sails to swing over from one side to the other when running free, through the wind getting on the lee side of the sails. Also jibe. The opposite of tacking.

HALYARD TACKLE. Tackle fastened to the tye, by means of which a yard is hoisted or lowered. Also called halyard purchase.

HANK. A small coil of line, yarn, or cord.

HARBOR. Any place which affords good anchorage and a fairly safe station for ships, or in which ships can be sheltered by the land from wind and sea. Also called haven. It is not necessary that it be land-locked or absolutely safe for ships. It is enough that it affords a reasonably safe place of retreat from wind and storms. A place where ships are brought for commercial purposes to load and unload goods and passengers.

HARD. To the full extent; therefore, to put the helm hard over; to put it as far as it will go in the direction indicated, that is, port or starboard.

HATCH. An opening, generally rectangular, in a ship's deck affording access into the compartment below. Also hatchway.

HATCH COVER. A wooden cover or metallic shutter fitted over a hatchway to prevent the ingress of water into the ship's hold. Also called hatchway cover.

HAUL. To pull on a rope, in a general sense. It is more particularly applied when pulling upon a single rope without the assistance of blocks or other mechanical contrivance. The particular nature of the pull is usually indicated by the word used with "haul," as haul up, haul in and so on.

HAWSEPIPE. A cylindrical or elliptical pipe made of cast steel or iron, situated near the stem, through which the anchor cable runs.

HEAD. The upper part of a triangular fore-and-aft sail, such as a jib or staysail, where the halyards are made fast.

HEADING. The direction in which a ship actually points or head at any particular moment. It is the angle between the meridian and the ship's keel, and is expressed in the same manner as the course.

HEADSAILS. Generic term for all sails which may be set on the bowsprit, jibboom, and flying jibboom, or forward of the foremost mast. The term is sometimes extended to include the sails set on the foremast.

~~HEADWAY. The vessel's motion forward or astern.~~

HEADWAY. A vessel's motion forward or ahead.

HEAD WIND. A breeze blowing from the direction of the ship's intended course. Also called foul wind.

HEAVE (TO). To pull on a rope or cable with mechanical aid, as distinguished from hauling by hand.

HELM. The helm proper is the tiller, but the term is often used to mean the rudder and the gear for turning it. The word "helm" describes the whole of the steering apparatus in the form of rudder, tiller, chains, engine, wheel, telemotor, and so on.

HIGH TIDE OR HIGH WATER. The maximum height reached by a rising tide. The height may be due solely to the periodic tidal forces or it may have superimposed upon it the effects of prevailing meteorological conditions.

HITCH. A temporary knot by which a rope is fastened to another object, either directly or around it.

HOIST. To raise or lift, especially by means of a rope, block, or tackle.

HOLD. A general name for the spaces below deck, designated for the stowage of cargo. More particularly those spaces between the lowest deck and bottom of the ship or tank-top, if there is a double bottom.

HORN. 1. One of the side pieces which form the jaw of a gaff or boom. 2. One of the outer ends of corstrees. Also one of the horizontal arms of a cleat. 3. That part of a fog signal apparatus which distributes and amplifies the sound emitted therefrom.

HORSE. A bar of iron or a rope on which some part of the rigging is made to travel. A rope for a sail to travel on.

HULL. The body of a vessel exclusive of masts, yards, sails, rigging, machinery and equipment.

INBOARD. Toward the fore-and-aft centerline of the ship. Inside the deck edge or shell plating, as opposed to outboard.

INTERNAL-STRAPPED BLOCK. A built-up wooden block in which a wroughtiron or steel strap is fitted in the shell. When there are several sheaves there is a strap on each side of every sheave. The pin works on the strap instead of the shell as is true of rope-strapped block. These blocks are measured in circumference from crown to tail, around the score. Also called internal-bound block.

IRONS, IN. A vessel under sail is in irons when up in the wind and unable to pay off on either tack.

JAW. The fore end of a gaff which half encircles the mast, the prongs of which are called checks or horns. It is also called throat.

JETTY. An engineering structure projecting into the water, of the nature of a pier, dike, embankment, constructed of timber, earth, stone or a combination thereof. By means of jetties at the mouth of a river and at the entrance to a tidal harbor, the channel may be narrowed and the current concentrated so as to increase the depth of water over the entrance bar.

JIB. A triangular sail extended upon a stay between the bowsprit or jibboom and the foremast. It is usual, except in very small vessels, to carry 3 or 4 jibs named, from inboard, fore-topmast staysail, inner jib, outer jib, flying jib. Among headsails, jibs are the most powerful sails for casting or turning the ship's head, being at the greatest distance from the vessel's center of effort. They are usually cut on the diagonal plan with the cloths perpendicular to the foot and leech. The luff rope is made of wire or fiber rope.

JIBE. To shift suddenly and with force from one side to the other. Said of fore-and-aft sails when through bad steering or some other unexpected cause, the wind being aft or on the quarter, the sails fill suddenly on the opposite side. When sailing free, to put the helm over so as to bring the boom on the opposite side. Also gybe.

JIG. A small tackle composed of a double and a single block or two single blocks. The upper block is fastened permanently or temporarily to the end of a topping lift, halyard, runner, and so on, or to its purchase, the lower block to an eyeplate or some fixed object on deck. Also called jigger.

JURY. Term used in connection with any temporary or makeshift fitting, structure, rig, gear, sail and so on, used in an emergency to work a vessel or boat to the nearest port.

KAPOK. The silky fibers investing the seed pods of the kapok tree found chiefly in Java. Kapok is very buoyant and will carry about 25 times its own weight in fresh water, while cork carries only 6 times its weight. On account of its great buoyancy and freedom from water-logging it is employed to a large extent in the manufacture of lifebuoys, lifebelts, seat covers and other lifesaving appliances.

KEDGE ANCHOR. A light anchor used for kedging a ship from place to place. That is, the anchor is carried out to a distance from the ship, and dropped. The ship is then pulled to it by means of capstans or winches. It is the smallest anchor on board.

KEEL. The main center-line structural member, running fore and aft along the bottom of a ship, sometimes referred to as the backbone. It is composed either of long bars scarfed at their ends, or in larger ships of heavy plates connected by riveting or welding. In wooden vessels it is composed of pieces of timber as long as can be obtained, scarfed together at their ends.

KINK. A sharp bend which disturbs the lay of a rope, generally due to an excess of twist.

KNEE. A plate, usually of triangular shape, provided for the purpose of rigidly connecting intersecting structural members. Also called plate

bracket, plate knee. Chiefly used in shipbuilding for attaching beam ends to frames, frames to margin plate, deck girders to beams or to bulkheads, and so on.

KNOT. A unit of speed. The term "knot" means velocity in nautical miles per hour whether of a vessel or a current. It is the measurement of a section of a (chip) log line usually 47 ft. and 3 in. long.

An interlacement of parts of a rope by twisting the ends about each other and then drawing tight the loops thus formed for the purpose of fastening them together or to another object or to prevent slipping. In a general sense the term "knot" embraces the words "bend" and "hitch." In a more restricted sense knot may be defined as a method of forming a knob, a loop or a noose in a rope. In practice the three terms "knot," "bend," and "hitch" are rather loosely used.

LACE. To draw together with a lacing passed through eyelet holes such as an awning, a bonnet, and so on.

LANYARD. A rope reeving through the deadeyes, used for setting up the rigging. Lanyards are made of four-strand hard-laid tarred hemp or Manila 2 to 4½ in. in circumference, or of fine steel wire. In most vessels nowadays turnbuckles are used with wire rigging in lieu of lanyards.

LASHING. A general term given to any rope or small stuff used for binding or making fast one thigh to another, such as an eye to a spar, a spar to another, and so on.

LAY. The direction in which the different strands of a rope are twisted, also the amount of twist. The twisting or turning of the several component parts or strands forming a rope. The twist in the strands is designated as the foreturn and that in the rope itself as the afterturn. In a well-laid rope these turns balance each other, the opposite turns acting against each other to keep the strands together. The strength of a rope depends to some extent upon the amount of twist or lay in it. The softer the lay, the stronger the rope, but the poorer the wearing qualities. A rope is soft, medium, common, plain-, or hard-laid.

LAZY JACK. One of the lines rove through thimbles seized on to the boom topping lifts and looped under the boom. Also called lazy line, jack, gathering line. When the sail is lowered they prevent the folds of canvas from falling on deck.

LEAD.

LEADS. The parts of the fall in a tackle between the two blocks.

LEE. Of or pertaining to the part or side toward which the wind blows, or which is sheltered from the wind, as opposed to weather.

LEECH. The side of a square sail, or the afteredge of a fore-and-aft sail. Also called skirt when referring to square sails.

LEE HELM. A sailing craft is said to carry lee helm when the helm has

to be kept alee to counteract slackness and keep it on its course.

LEE SHORE. The shore that lies under a vessel's lee.

LEE SIDE. The side of a ship which is farther from the wind.

LEEWARD. Situated on the side turned away from the wind as opposed to windward. Toward the lee.

LEEWAY. The lateral movement of a ship to leeward of her course, estimated from the angle formed between the line of the ship's keel and the line which the ship actually describes through the water, as shown by her wake. Also called drift.

LET GO. To set free, let loose, or cast off as a rope.

LET RUN. Also to let go by the run. To let a rope or chain go quickly or suddenly.

LIFE PRESERVER. A contrivance used to support the human body in the water. Also called life jacket, life belt. Life belts are made of various materials and in various forms.

LIFT. A wire rope or chain used for taking the weight of a yard, boom, derrick, and so on, and enabling it to be topped to the desired angle. Also called topping lift. It leads from the end of the spar through a masthead block.

LINE. General term for ropes or cords of different sizes used for various purposes on board ship.

LOG (TO). To enter in the official logbook the name of a seaman with his offence and the penalty attached to it. Also to enter or record in the logbook any special event such as births, deaths and so on.

LOGBOOK. A ship's journal or tabulated summary of the performance of the vessel, her engines and other daily events. The logbook is regarded as legal evidence on matters which the master is required by law to enter therein. In a collision suit the logbooks are admissible as evidence when called for and when a testimony is more intelligible by a reference to them. In order to establish a valid claim under a policy of marine insurance the evidence necessary to prove that some accident has overtaken the vessel is furnished by the logbook as well as by the master's protest. Also called Log.

LOOKOUT. A member of the crew stationed on the forecastle or in the crow's nest whose duty it is to watch for any dangerous object lying near the ship's track, for any other vessel heaving in sight, and so on. Also called lookout man.

LOOP. The bight of a small rope.

LOOSE. To let go: to cast the gaskets or strops from a furled sail. Also called unfurl.

LOWER MAST. A term applied to the lowest part of a compound mast composed of two or more poles. Lower masts rest on a step placed as low as possible, usually on the keelson in sailing craft.

LUFF (TO). To bring a vessel's head nearer to the wind by putting the helm down or increasing the sail area toward the stern.

MAINSAIL. The square sail set from the main yard. In fore-and-aft-rigged vessels, this term applies to the largest sail set from the mainmast.

MAKE FAST. To secure the belaying turns of a rope around a cleat or belaying pin by adding a single hitch.

MAKE SAIL. To get sails on a ship whether starting with bare poles or adding to sails already set. In the latter case each individual sail is set (not made).

MALLET. A hammer-shaped wooden implement used by sailmakers, wood-calkers, riggers, shipwrights. The head is made of wood and the striking faces are ringed with iron.

MAN. To provide a ship or boat with a sufficient number of hands and equipment to navigate it. An order to a boat's crew to embark.

MANILA ROPE. A rope made from the fibers obtained from the leaves of the Musa Textilis or Abaca plant. Manila rope is usually made up of three strands up to 3-in. circumference, and above that size of four strands with a core. It is preferred to Italian or Russian hemp for hawsers and running gear because it is lighter, more flexible, and does not require tarring for preservation. Manila rope is stronger than tarred hemp. It is sometimes called Manila hemp. The smaller sizes of Manila ropes are usually known as 6 thread, 9 thread, 12 thread and so on, according to the number of yarns they contain. These sizes are used on small craft for bending and/or lacing sails to spars.

MARLINE. Two-stranded, lightly tarred or untarred hemp cord laid up left-handed with very little twist. It is commonly used for service, lashings, mousings, and as seizing stuff. It is also employed when securing stuff. It is also employed when securing boltropes to large sails instead of sewing.

MARLIN SPIKE. A pointed steel tool about 16 in. long, used by riggers and seamen to separate the strands of rope when splicing and also as a lever when putting on seizings, marling, etc. Spikes used with fiber rope have a round head and the body is uniformly tapered to a fine point. Spikes used for wire splicing have an enlarged flattened head with wedge-shaped point. All spikes are provided with an eye near the head for slinging with a lanyard. Also called marlingspike.

MARLIN SPIKE SEAMANSHIP. The care, handling, knotting, splicing, and use of the fiber and wire rope.

MARRY. To join two ropes together for the purpose of reeving by placing them end to end and connecting them by worming or seizing.

MAST. A straight piece of timber or a hollow cylinder of wood or metal set up vertically or nearly so and supporting yards, booms, derricks, or gaffs. In fore-and-aft-rigged vessels each mast is commonly made of two parts, called the lower mast and the topmast respectively. On large sailing vessels the masts are composed of several lengths called lower mast, topmast, topgallant mast, and royal mast. Since the adoption of steel spars in recent years, the lower and topmast are usually made of one piece. The royal mast, although made of wood forms a single spar with the topgallant mast.

The masts of two-masted craft are called foremast and mainmast, except in ketch and yawl-rigged craft; of the three-masted craft, foremast, mainmast, and mizzenmast. In square-rigged vessels with four or five masts the after mast is called spanker mast or jigger mast when it is smaller than the other masts and fore-and-aft rigged. In vessels having four masts these are usually distinguished as foremast, forward mainmast, after mainmast, mizzenmast. When the masts exceed four in number there is no fixed rule. The extra mast is sometimes called middlemast. In fore-and-aft-rigged vessels having five masts they are named as follows: foremast, mainmast, mizzenmast, jigger mast, spanker mast. The name pusher or driver is occasionally given to the aftermost mast of a six-masted schooner. In the seven-masted schooner "Thomas W. Lawson" the following names were given to the masts abaft the mizzen: jigger mast, spanker mast, pusher mast, driver mast.

MAST BAND. A metal band fitted with a number of lugs for taking the blocks of various purchases; also a band below the hounds for taking cap and trestle stays.

MASTER. The commanding officer of a merchant or fishing vessel. Also called master mariner, shipmaster. The term master includes every person except a pilot who has command or charge of a ship. The master of a vessel has general charge of the ship. He must be duly certified for his position. His duties include starting the ship at the proper time and providing a competent crew as well as proper equipment. He must manage the vessel during the voyage and navigate according to the manner which has been agreed upon. Because of his peculiar position and his inability to call in officers of the law to assist him, he is invested with special disciplinary power over all persons on board.

MAST HOOP. One of the rings of wood or metal by which the luff of a gaff sail is confined to the mast as the sail is hoisted or lowered. Hoops are seized with marline to cringles in the luff of the sail. Also called mast ring.

MEAN HIGH WATER. In tidal terminology refers to the average height of all high waters taken over several years thus eliminating inequalities.

MEAN LOW WATER. The average height at any place of all the low waters calculated over a considerable period of time.

MOLDING. Half-round iron or strip of wood running fore and aft on the outside of a boat or ship at deck or gunwale level. Also called nosing, abband, rubber. In ships it is used for finishing or ornamental purposes. In open boats it strengthens the gunwale and acts as a fender.

MONKEY FIST. A heavy knot made of 9- or 12- thread line and worked in the end of a heaving line to weight it. A lead or iron weight is placed inside the knob before the turns are worked taut.

MOOR. To secure a ship, boat, or other floating object in a particular place by means of chains or ropes which are made fast to the shore, to anchors, or to anchored mooring buoys.

MOORING. The place in a river, harbor, or dock in which a vessel may be moored; also that to which vessels may be secured.

MOORING BITTS. Large hollow cast-iron standards placed in pairs, to which mooring lines are made fast. Also called mooring bollards, timber-heads. They are bolted to the deck in such position as to give a good lead to the mooring pipes.

MOORING LINE. Any chain, cable, or hawser by which a vessel is secured to a dock or mooring. Also called mooring hawser.

MOORINGS. The anchors, chains, bridles, and so on, laid athwart the bottom of a river or harbor, by which a ship is secured.

MOP. A bunch of thrums or coarse yarn; a piece of cloth fastened to a long handle and used for cleaning floors, drying decks, and clamping down. Also called swab.

MOUSE. To seize a piece of small stuff across a hook used in the rigging to prevent its unhooking.

NAUTICAL CHART. A map of water area including the adjoining land, intended primarily for the use of mariners. The main purpose of charts is to assist navigation. Shoals, rocks, and other dangers are shown by special markings and by various symbols; soundings with abbreviations, indicating the nature of the bottom. Depth contours are drawn joining together points of like depths near shore and around shoals. Light-houses, buoys, and other artificial aids to navigation are represented by descriptive abbreviations and symbols. Currents are indicated by arrows or by explanatory notes. Compass roses printed on the charts give the necessary data concerning magnetic variation and its rate of change.

NAUTICAL MILE. The standard unit of measure for marine navigation and for work with the Mercator chart. The nautical mile is 6,080 feet, being for practical purposes the length of one minute of arc of a meridian or of the equator. Also called Admiralty mile (G. B.)

NAVIGATION. The nautical art or science of conducting a ship from one place to another. The two fundamental problems in navigation are: first, the determination of the ship's position at any required moment, and secondly, the future course to be steered to reach the desired point.

OAKUM. A calking material used in waterproofing the seams between strakes of planking. It is a mass of strong, pliable tarred rope fibers obtained from scrap rope, which swell when wet.

ON THE QUARTER. In a position between abeam and astern. Strictly 45 degrees abaft the beam.

OUTFIT. All objects necessary to the navigation of the ship, including sails, rigging, spare ropes, provisions for the crew, and so on. In fishing vessels, outfit includes the fishing gear, casks, staves and so on, needed for the successful prosecution of the voyage.

PALM. The flattened end of an anchor arm which bites into the ground. Also called wrist, fluke. Spade-shaped palms are best for muddy bottoms because this shape of palm will dig in and hold where no other palm will.

PARCEL (TO). To protect a rope from the weather by winding strips of canvas or other material around it, with the lay, preparatory to serving.

PART. In a tackle, the different sections of the fall.

PASSENGER. One who travels on a ship by virtue of a contract with the carrier, and who is paying a fare. The term "passenger" includes any person carried in a ship other than the master, the crew, and the owner and his family and servants.

PASS. To reeve and secure. For example, to pass a line is to reeve and secure it; to pass a stopper is to reeve and secure the stopper.

PAWL. A short piece of steel hinged at one end to the pawl head of a capstan. It drops by gravity into the cogs of the pawl rim as the capstan revolves, acting as a catch or brake to prevent any backward motion when the power is removed. Also called click, drop pawl.

PAY OFF. To fall off from the wind in consequence of the force exerted by the rudder or the arrangement of the sails or both.

PAY OUT. To slack out on a line made fast on board.

PEAK. The angle formed by the head and leech of a gaff sail. The greater the angle the less peak the sail is said to have. The upper after corner of a quadrilateral fore-and-aft sail.

PENDANT. A short rope hanging from the head of a mast, a yardarm or the clew of a sail, having a block or thimble spliced on the free end. A whip or tackle is fixed at the block end and the other end is made fast to a yard boom or gaff and serves as a brace, guy, or vang. The word "pendant" is generally used with a qualification defining the position or purpose of the rope. Also called rigging pendant, pennant.

PENNANT. A flag with the fly usually much longer than the hoist and tapering to a point, used for signaling or for dressing ship. Also called pendant.

PIER. In the United States a pier is a projecting quay or wharf running at an angle with the shoreline and providing a landing place on each side for vessels to receive and discharge cargo or land passengers.

PILOT. A qualified individual possessing local knowledge of shallows, rocks, currents, and so on, and usually licensed by public authority, who is taken on board at a particular place, to conduct a ship through a river, road or channel, or from or into port.

PILOT LADDER. Rope ladder in which each rung is made of a flat piece of wood pierced by four holes, two at each end, through which the four side ropes are rove. Strong cross seizings are put on just below the rung on each side bending the two side ropes together.

PINCH. To sail a boat so close to the wind as to allow the sails to shiver.

PIN RAIL. A rail placed at the side of a vessel for holding belaying pins.

PLANK. A long narrow piece of sawed timber fastened on the outside or inside of frames, beams and so on.

POINT (TO). A vessel under sail is said to "point hight" when it lays a course very close to the wind.

POINTS OF SAILING. Sailing points may be defined as the different courses followed by any craft under sail when compared to the direction of the wind. They are named according to the angle between the direction of the wind, and the fore-and-aft line of the vessel. When this angle is near 180 degrees the ship is said to be sailing with the wind aft. When it is about 135 degrees it is sailing with the wind on the quarter, or quartering; when about 90 degrees it is running free. When the angle is between 60 and 30 degrees, the ship is said to be close-hauled, on the wind or by the wind.

PORT. A place for loading and unloading of vessels recognized and supervised for maritime purposes by the public authorities.

The left side of a vessel when looking forward.

PORTHOLE. One of the circular openings provided in the sides of a vessel or superstructure to give light and ventilation to living quarters.

PREVENTER. An additional rope or wire fitted with tackle and attached to or placed alongside a heavily laden rope, brace or backstay to relieve effort and prevent accident.

PROPELLER. A propulsive device consisting of a boss or hub carrying radial blades from two to four in number, the rear or driving faces of which form portions of an approximately helical surface, the axis of which is the center line of the propeller shaft. Also called screw propeller.

QUARTER. The curved portion of a ship on either side at the stern. The upper part of a vessel's sides near the stern. The term "quarter" literally implies one quarter of the ship, but usually applies to 45 degrees abaft the beam.

QUARTER RAIL. On American schooners, a light open railing fitted above the bulwarks and extending around the quarters and stern of the vessel.

It serves as guard for the quarter deck. Also called quarterdeck rail, monkey rail.

RATLINE. One of the small lines crossing the shrouds and forming rope runs used by seamen for going aloft. They are fixed about 15 in. apart by a seizing at each end and a clove hitch to each shroud in between. Ratlines are made of ratline stuff.

REACH. Any course sailed with started sheets that is not directly before the wind. A long tack with the wind nearly abeam but always forward of it. Sailing with a beam wind.

REEVE. To pass or run through any hole in a block, thimble, cleat, ringbolt, and so on, as to reeve the end of a rope.

RIDE. To lie at anchor; said of a vessel when kept at some particular spot by her anchor. A vessel at anchor is said to be "riding weather tide" when the wind is against the tide and "riding lee tide" when the wind and tide are in the same direction.

RIG. The rig of a vessel is the distinctive manner in which her masts and sails are disposed. There are two main types of rigs: the square and the fore-and-aft rig.

RIGGER. A shipyard worker who, during the vessel's construction, sets in place heavy structural parts such as stem, sternpost, masts, and spars, and assists in hoisting, lowering, and handling all structural components. Also called erector.

One who installs all gear and fittings of wire and fiber rope on a ship. He fabricates and installs shrouds, stays, lifts, braces, radio aerials, and other rigging fitted to masts and spars; lays out and cuts materials according to drawings and specifications; splices fiber and wire rope where necessary; bolts or ties rigging in place.

RIGGING. A general term for all ropes, chains and gear used for supporting and operating masts, yards, booms, gaffs and sails. Rigging is of two kinds, standing rigging and running rigging. More generally, the whole apparatus of spars including the masts, yards, sails and cordage, by which the force of the wind is utilized to move a sailing vessel against the resistance of the water.

ROPE LADDER. A generic term for different kinds of flexible ladders in which the rungs are held on each side by one or two ropes.

ROUND (TO). To come to the wind. To haul by the wind when sailing large.

RUDDER. A device used for steering and maneuvering a vessel. The most common type consists of a flat plane surface of wood or steel hinged at the forward end to the stern- or rudderpost and rounded at the after end to make a fair ending to the lines of the vessel.

RUN (TO). To sail before the wind as distinguished from reaching or sailing closehauled.

RUN AGROUND (TO). Said of a ship accidentally driven ashore in a stranded manner or condition.

RUNNING LIGHTS. A general term applied to the various lights carried from sunset to sunrise by different classes of vessels when under way, in accordance with the International Regulations for Preventing Collisions at Sea.

RUNNING RIGGING. That part of the rigging which includes the moving or movable ropes hauled upon to brace the yards, make and take in sails, operate gaffs and booms, raise and lower upper masts, hoist weights, and so on. Such gear is chiefly made of Manila rope, but Italian hemp, cotton rope and flexible steel wire or chain are also used.

SAIL. A piece of cloth, fabric, texture, or tissue of some kind spread to the wind to cause, or assist in causing, a vessel to move through the water. Sails are usually made of several breadths of canvas sewed together with a double seam at the border and edged all around with a rope called bolt-rope.

SAIL (TO). To move along over the water by the action of the wind upon sails.

SAIL BOOM. A spar by which the foot of a sail is extended. Sail booms take their names from the sails to which they are attached. They constitute the only means by which some sails can be taken beyond the ship's sides (gaff sails, jibs, and spinnakers) and they help to keep the sails flat. The inner end of the boom is fastened to the mast by jaws or by a gooseneck.

SAILING TRIM. The arrangement or position of the yards and sails in order that the wind may act upon them at the desired angle.

SAMSON POST.

SCANDALIZE. To leave a sail partially set. To reduce sail in an unusual manner, as, for instance, to lower the peak of a gaff sail without touching the throat halyards, or, also, to trice up the tack and lower the peak until the gaff is perpendicular to the mast.

SCOW. A flat-bottomed boat with sloping ends. The bow and stern are square across instead of coming to a point. Some have the same width fore and aft while others narrow slightly toward the ends. As a general service boat it is easy to build, easy to beach, very stable, and of great carrying capacity.

SCOW SCHOONER. A 2-masted schooner with punt-shaped hull, false cut-water, and centerboard, used as market boat or lighter in San Francisco Bay.

SCUPPER. One of the drains set in decks to carry off accumulation of rain or sea water.

SEAM. An edge joint of two plates, whether flush or lapped or the joint between adjacent planks. Also, the slight crevice between the ends or

edges of butt laps.

SEAMANSHIP. A general term for the art by which vessels of all classes and sizes are handled in all conditions of weather. The principles of seamanship may be stated in a literary form but a mastery of it can be acquired only by actual practice at sea.

SEAWORTHINESS. The sufficiency of a vessel in materials, construction, equipment, crew, and outfit for the trade or service in which it is employed.

SEIZE. To bind, lash, or make fast a rope to another, a rope to a spar, and so on, with several turns of small stuff such as spun yarn, marline, or specially made seizing stuff.

SENNIT, SENNET. Braided cordage made from untarred marline rope yarns or spun-yarn plaited by hand. Also called sinnet.

SERVE. To bind or wind a rope tightly with small cord, spun yarn or marline, keeping the turns very close together.

SERVING Mallet. A cylindrical piece of ash or *Ignum vitae* wood fitted with a handle and having a groove on one side to fit the convexity of a rope. It is used as an aid in serving ropes or wrapping them round with spun yarn, and so on, to prevent chafing.

SET. Collectively speaking: a number of sails which complement each other and fit the spars of a vessel or boat. Also called suit.

SHACKLE. A bow-shaped, D-shaped, saddle-shaped, or U-shaped wrought-iron or steel fitting with a pin across the throat, used as a connection between lengths of chain, or to attach other fittings. Shackles used in the rigging have a threaded pin, whereas those used for joining lengths of anchor chains have a smooth, heavy pin, held in place by a small cotter.

SHEAVE. A grooved wheel in a block, mast, yard, and so on, over which a rope passes. The sheave, which is bushed, rotates upon the pin. Sheaves are made of wood, bronze, or galvanized cast-iron or steel.

SHEET. A rope or chain fastened to one or both of the lower corners of a sail, and used to extend it or to change its direction. The ropes, in the square sails above the course, by which the clews are extended. In the courses, each clew has a tack and sheet, the tack being used to extend the weather clew, and the sheet the lee clew. In fore-and-aft sails, except gaff topsails, the sheet secures the after lower corner and the tack the forward lower corner. In studding sails the tack secures the out clew and the sheet the inner one.

SIRLOUD. One of a set of strong wires or hemp ropes extending on each side of a masthead to the sides of the ship to support a mast laterally.

SMALL STUFF. General name given to all the small lines or ropes under one inch in circumference used on board ship.

SWATCH BLOCK. A single block so fitted that the bight of a rope may be passed through it, without the delay of reeving or unreeving. The iron strap is hinged on one side and the shell is divided to allow the rope to be shipped into the sheave.

SPAR. A general term for a piece of timber or round section and of great length in proportion to its diameter, used for masts, yards, booms, gaffs, bowsprits, and so on. Spars are cut from strong, sound, straight grain, slow growth, live and straight trees

SPLICE. A method of joining rope by interweaving the strands. A splice is a more intimate junction of parts than a knot, the lay of the rope being opened and the ends tucked in so that the size and character of the rope at the place where the splice is made are not greatly changed.

SPLICING FID. A tapered wooden pin, 12 to 24 in. long, rounded at the end, and made of hickory or lignum vitae wood. It is used by riggers and sailmakers for opening the strands of a rope, and so on.

SPRING. A shore mooring line diagonal to the keel and exerting a force, when power is applied to it, both in the direction of the keel and at right angles to it. It is therefore used for moving a vessel lying alongside a quay or pier ahead or astern, breasting her in at the same time. Also called spring line, spring rope.

STANCHION. In wooden vessels, a rough log used as a pillar in the ship's hold.

STAND BY. To be in readiness. To be prepared to execute an order.

STAND CLEAR. To keep out of the way. To keep away from.

STANDING BLOCK. A block fastened to some permanent support, as distinguished from a running block, which is attached to the object to be raised or moved.

STANDING BOWSPRIT. A bowsprit permanently fixed, as distinguished from a running bowsprit.

STANDING RIGGING. Semipermanent rigging which acts chiefly to support the masts; that is, shrouds, stays, backstays, and so on. When once in position these are not moved except when they require adjustment or renewal. Yards, gaffs, and booms have some standing rigging for their support, or for other purposes.

STAY. A strong rope, generally of wire, forming part of the standing rigging, used as a support for spars and more especially masts.

STAYSAIL. A triangular or trapezoidal fore-and-aft sail hoisted on stay. It is held down by its tack, and is confined to the stay by iron thimbles, rings, hanks, bridles, or lacings, toggled into the stay holes or into eyelets.

STEADY. An order to the helmsman to keep the ship's head in the direction the vessel is on at the moment the order is given. Also "steady as you go."

STEER. To guide a vessel by the movements of a rudder or helm.

STERN. The afterpart of a ship or boat.

STOCKED ANCHOR. An anchor made of a steel shank to one end of which two curved arms are forged. The other end of the shank is bored to receive the stock, which is attached at right angles to the arms and shank.

STOPPER. A short length of rope or chain, or a steel fitting used on board ship for checking the running of a rope or chain cable, or for holding it firmly while it is being belayed.

TACK. The direction of a vessel's head with regard to the trim of its sails; as, on the starboard tack, it has the wind on the starboard side. The run of a vessel on one tack.

TACK (TO). The change the course of a ship when sailing by the wind by turning her head toward the wind so that it will sail at the same angle with the wind on the other side. To change from the port tack to the starboard tack, or vice versa. Also called go about, stay.

TACKLE. A combination of ropes and blocks working together, or any similar contrivance affording a mechanical advantage to assist in lifting or controlling a weight or applying tension on board ship.

TARRED ROPE. Fiber rope is tarred when it is to be exposed to the weather. Tarred rope is only about 75 per cent as strong as untarred or white rope, and becomes less strong with time. Also called black rope.

THIMBLE. A round or heart-shaped fitting made from gun metal, galvanized iron, solid or light brass, with a deep scar in its outer surface, around which an eye may be spliced in hemp or wire rope.

THROAT. The forward or inner end of a gaff where the cheeks are fitted so as to enclose the mast. Also called jaw.

THROAT HALYARDS. The rope or purchase hooked to the jaws of a gaff and by which it is hoisted.

TIDE. Oscillations of the ocean occasioned by the combined action of the sun and moon. The relative effect of these two bodies is directly proportional to their mass and inversely proportional to the square of their distance.

TONGUE. A block of wood placed vertically between the jaws of a gaff to facilitate the sliding of the spar up and down the mast when the throat halyards are hauled.

TOPMAST. The spar next above a lower mast and below the topgallant mast in a square-rigger. In fore-and-aft-rigged vessels, the upper and smaller spar.

TOWING PAINTER. A length of tarred hemp or light chain for towing a dinghy or other small boat.

TRANSOM. The upper part of the stern above the counter in a square sterned vessel. The transverse planking which forms the afterend of a small square-ended boat.

TRAVELER. The ring of a sheet block which travels on a deck or boom horse. An iron ring, thimble, or strap which travels on a spar, a bar, or a rope.

TRIATIC STAY. A wire secured to the topmast head of a fore-and-aft rigged vessel and leading to the lower masthead of the mast next abaft it, acting as a support to the topmast.

TRIM (TO). To haul or dispose the yards and sails in such a manner that the wind strikes them at the desired angle.

To arrange the weights in a vessel in such a manner as to obtain desired immersion at the bow and stern.

UNLASH. To loose, unfasten, or separate, as something lashed or tied down.

UNLAY. To untwist the strands of a rope.

VANE. A small piece of bunting or a thin piece of sheet metal carried at the truck, free to rotate on a spindle. Also called fly. It indicates the direction of the wind.

VESSEL. A general term for all craft capable of floating on water and larger than a rowboat. The term vessel includes every description of water craft or other artificial contrivance used or capable of being used as a means of transportation on water.

WAKE. The disturbed column of water around and behind a moving ship which is set into motion by the passage of the vessel.

WARP (TO). To move a vessel from one place to another in a port, river, harbor by means of warps fastened to buoys, anchors or some fixed object ashore.

WEFT. In sailmaking, the width measurement of sail cloth, the length measure being the warp. The threads taken together which run across the warp from side to side. Also called woof, filling.

WHARF. A structure of timber or iron built on the shore of a harbor extending into deep water so that vessels may lie alongside close together. Also called pier.

WHELP. One of the sprockets on the wildcats of a windlass which engage the links of the chain cable.

WINCH. A hand- or power-driven machine having one or more drums or barrels on which to wind a chain or rope and used on board ship for hoisting or hauling.

WINDLASS. A special form of winch used to hoist the anchors, house them safely, and warp the ship when in harbor. It has two drums designed to grab the links of the anchor cables and is fitted with ratchet or braking device suitable for paying out cable.

WINDWARD. The general direction from which the wind blows. It is a point of reference in designating a movement or a location.

WING AND WING. The condition of the sails on a fore-and-aft-rigged vessel when running before the wind with her booms on opposite sides, the foresail on one side, the mainsail on the other.

YOKE. A steel frame or bar having its center bored and keyed for attachment to the rudderhead. Connecting rods or leads from the steering gear are connected to each end of the yoke.